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Encl: (1) Revised Draft Final Record of Decision, Inland Area Sites 13 and 17, Naval Weapons Station, Seal Beach Detachment, Concord California

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**REVISED DRAFT FINAL RECORD OF DECISION
INLAND AREA SITES 13 AND 17
NAVAL WEAPON STATION SEAL BEACH
DETACHMENT CONCORD
CONCORD, CALIFORNIA**

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October 30, 2001

**(Pursuant to the Comprehensive Environmental Response,
Compensation, and Liability Act)**

Issued by

**DEPARTMENT OF THE NAVY
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ABBREVIATIONS AND ACRONYMS

ATSDR	Agency for Toxic Substances and Disease Registry
BTEX	Benzene, toluene, ethylbenzene, and xylene
Cal/EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COEC	Chemical of ecological concern
COPC	Chemical of potential concern
DTSC	California Department of Toxic Substances Control
EPC	Exposure point concentration
ERA	Ecological risk assessment
ER-M	Effects range-median
HHRA	Human health risk assessment
HI	Hazard index
HQ	Hazard quotient
IAS	Initial assessment study
IRP	Installation restoration program
LeadSpread 7	Risk Assessment Spreadsheet Model Version 7
µg/L	Microgram per liter
mg/kg	Milligram per kilogram
mg/L	Milligram per liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PAH	Polynuclear aromatic hydrocarbon
PRC	PRC Environmental Management, Inc.
PRG	Preliminary remediation goal
RAB	Restoration advisory board
RI	Remedial investigation
ROD	Record of Decision
RPM	Remedial project manager
RWQCB	Regional Water Quality Control Board
SBD	Seal Beach Detachment
SI	Site investigation
SVOC	Semivolatile organic compound

ABBREVIATIONS AND ACCRONYMS (Continued)

TPH	Total petroleum hydrocarbons
TPH-d	TPH as diesel
TPH-mo	TPH as motor oil
TtEMI	Tetra Tech EM Inc.
UCL ₉₅	95 percent upper confidence limit on the arithmetic mean
U.S. EPA	U.S. Environmental Protection Agency
UST	Underground storage tank
VOC	Volatile organic compound

1.0 DECLARATION FOR NO ACTION AT NAVAL WEAPON STATION SBD CONCORD, INLAND AREA SITES 13 AND 17

1.1 SITE NAME AND LOCATION

This Record of Decision (ROD) includes Site 13 (Burn Area) and Site 17 (Building IA-24) located in the Inland Area at Naval Weapon Station Seal Beach Detachment (SBD) Concord, formerly known as Naval Weapon Station Concord, in Concord, California.

Naval Weapon Station SBD Concord was entered on the National Priorities List on December 16, 1994. Naval Weapon Station SBD Concord is an active base.

1.2 STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Sites 13 and 17 at Naval Weapon Station SBD Concord. The selected remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Supporting information for the Navy and the Agency's decisions of No Further Action for Site 13 and the No Action for Site 17 is contained in the Administrative Record file.

The U.S. Environmental Protection Agency (U.S. EPA) and the California Environmental Protection Agency (Cal/EPA) concur with the selected remedy.

1.3 DESCRIPTION OF THE SELECTED REMEDY: NO ACTION

The U.S. Department of the Navy, U.S. EPA Region 9, and Cal/EPA have selected no action as the remedy for Sites 13 and 17 of Naval Weapon Station SBD Concord. The Navy conducted a remedial investigation (RI) at Sites 13 and 17 that revealed the presence of hazardous substances in soil, sediment, and groundwater. Based on the findings of the RI, a human health risk assessment (HHRA) and ecological risk assessment (ERA) were completed for each site. Both assessments found no unacceptable risk under the residential or industrial land use scenarios. Therefore, no action is appropriate for these sites.

The Navy conducted the HHRA and ERA to evaluate whether hazardous substances at the sites pose a significant risk to human health and the environment. The HHRA evaluated potential risks to the most probable receptors (that is, workers or base personnel) from exposure to chemicals identified in soil, sediment, and groundwater. Under this scenario, potential carcinogenic risks and noncarcinogenic hazards do not pose

an unacceptable risk. At the request of the regulatory agencies, each site was also evaluated assuming that land use is unrestricted (that is, residential). An unrestricted land-use scenario generally provides the greatest potential for exposure to contaminants at a site and is very conservative (protective of health) in view of current and projected future land uses. The carcinogenic risks associated with potential residential exposure to chemicals detected at the two sites were within U.S. EPA target levels considered protective of human health, and the potential noncarcinogenic hazards were below levels of concern. Based on the results of the HHRA, conditions at the sites are considered protective of human health. Viable animal habitat is found nearby both Sites 13 and 17, but potential ecological risks are negligible.

1.4 STATUTORY DETERMINATIONS

Based on an evaluation of the analytical data, HHRA, and ERA, the Navy has concluded that no remedial action is necessary to protect human health and the environment at Sites 13 and 17.

Hazardous substances are not present at Sites 13 and 17 at concentrations that result in risks above acceptable risk levels and, therefore, the 5-year review requirement of CERCLA Section 121(c) is not applicable.

Commander J.C. Steelman
Officer-in-Charge
Naval Weapons Station
Seal Beach Detachment Concord

Date

Branch Chief
U.S. Environmental Protection Agency Region 9
Federal Facilities Cleanup Branch

Date

Chief
Northern California Operations
Office of Military Facilities
California Department of Toxic Substances Control

Date

Executive Director
California Regional Water Quality Control Board
San Francisco Bay Region

Date

2.0 DECISION SUMMARY FOR NAVAL WEAPON STATION SBD CONCORD, INLAND AREA SITES 13 AND 17

2.1 SITE NAME, LOCATION, AND DESCRIPTION

Naval Weapon Station SBD Concord is the major naval munitions transshipment facility on the west coast and is located in the north-central portion of Contra Costa County, California, 30 miles northeast of San Francisco. The facility, which encompasses 13,000 acres, is bounded by Suisun Bay to the north, by Los Medanos Hills and the city of Pittsburg to the east, and by the city of Concord to the south and west (Figure 1). Currently, the facility is made up of three main separate land holdings: the Tidal Area (which includes islands in Suisun Bay), the Inland Area, and a radiography facility in Pittsburg.

The Inland Area encompasses 6,200 acres. A Navy-owned road and rail line link the Inland Area to the Tidal Area. The Inland Area lies between Los Medanos Hills and the city of Concord, and is crossed by three public roads: State Route 4, Willow Pass Road, and Bailey Road (Figure 2).

Site 13 is a 1,100- by 1,400-square foot area located in the western portion of the Inland Area of Naval Weapon Station SBD Concord (Figure 3). Site 17 is located along the eastern side of Kinne Boulevard (Figure 4).

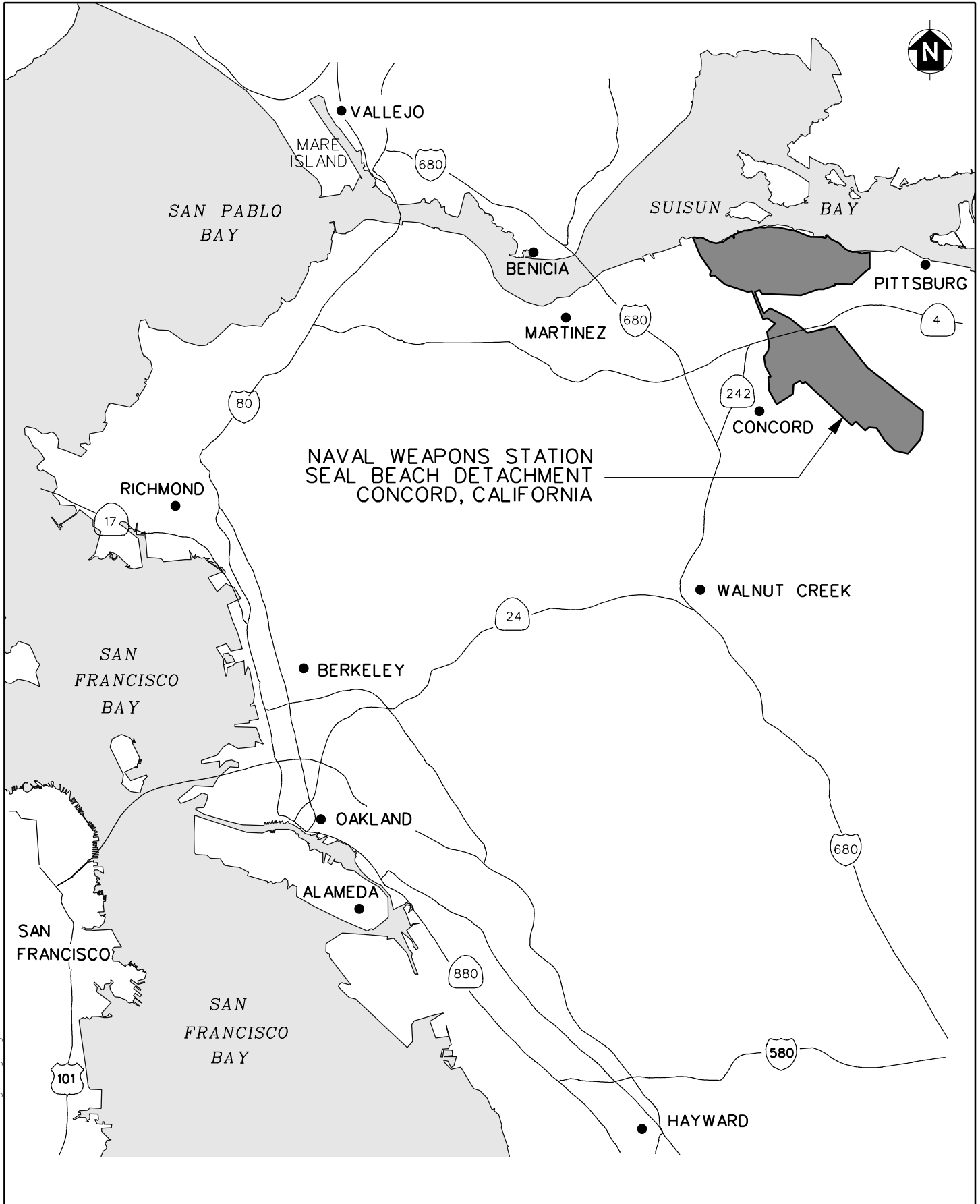
2.1.1 Physiography and Topography

Naval Weapon Station SBD Concord lies 10 miles west of the confluence of the Sacramento and San Joaquin Rivers. This confluence forms the Delta region, which contains more than 600 miles of interconnected and meandering tidal waterways.

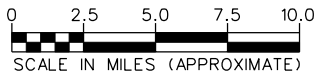
Most of the western half of the Inland Area is characterized by gently sloping land designated as alluvial slope. Steeply sloping terrain, beginning at 100 feet above mean sea level and rising to more than 800 feet above mean sea level, forms the northeast boundary of the Inland Area. These hills are composed of soft sandstone that erodes easily, making it poorly suited for construction.

2.1.2 Local Geology

Groundwater beneath the Inland Area is commonly found in the coarser sand and gravel units of the unconsolidated alluvial deposits. Typically, groundwater is first encountered at depths of approximately 25 to 50 feet below ground surface under semiconfined to confined conditions. Based on the available information,

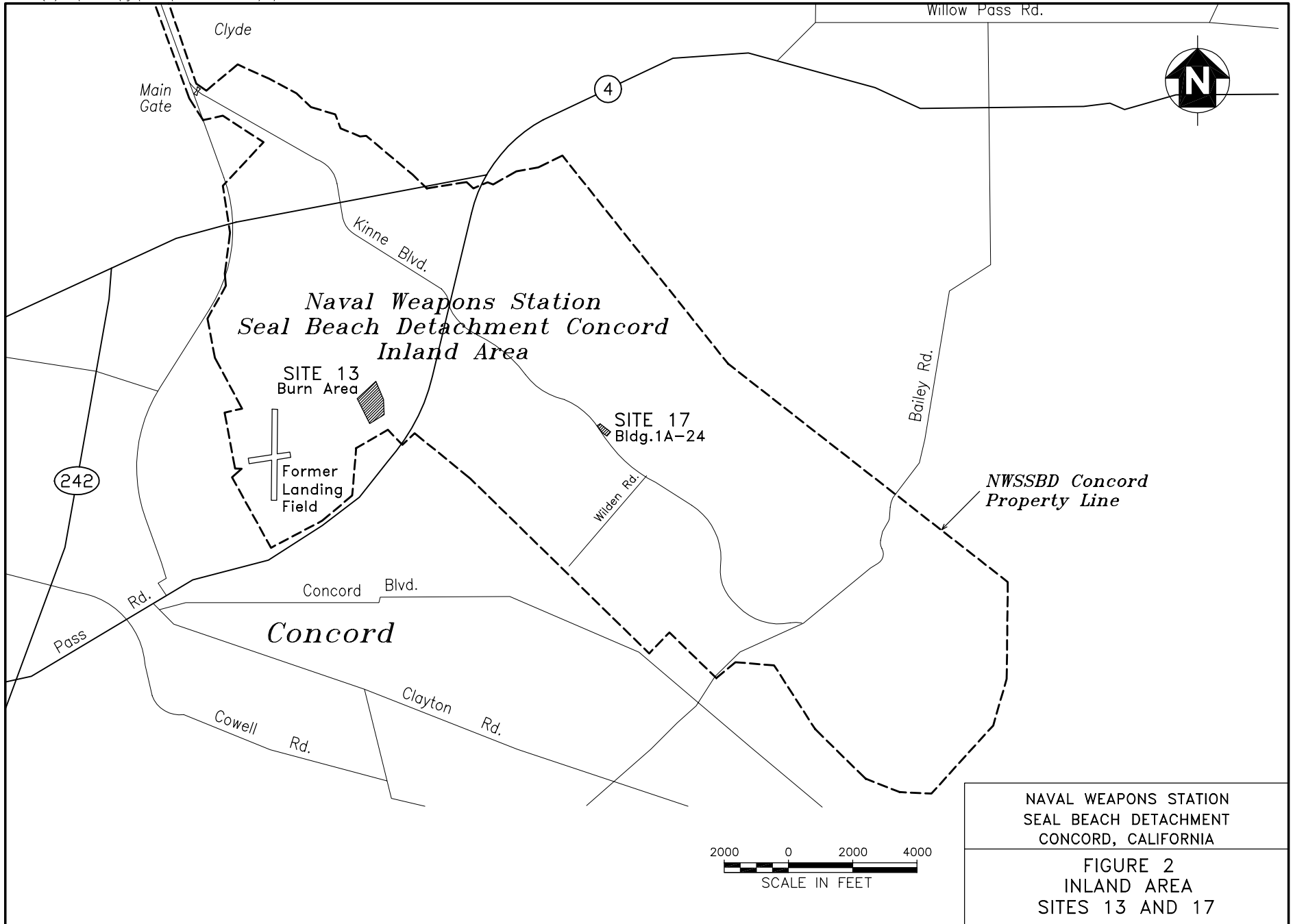


NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA

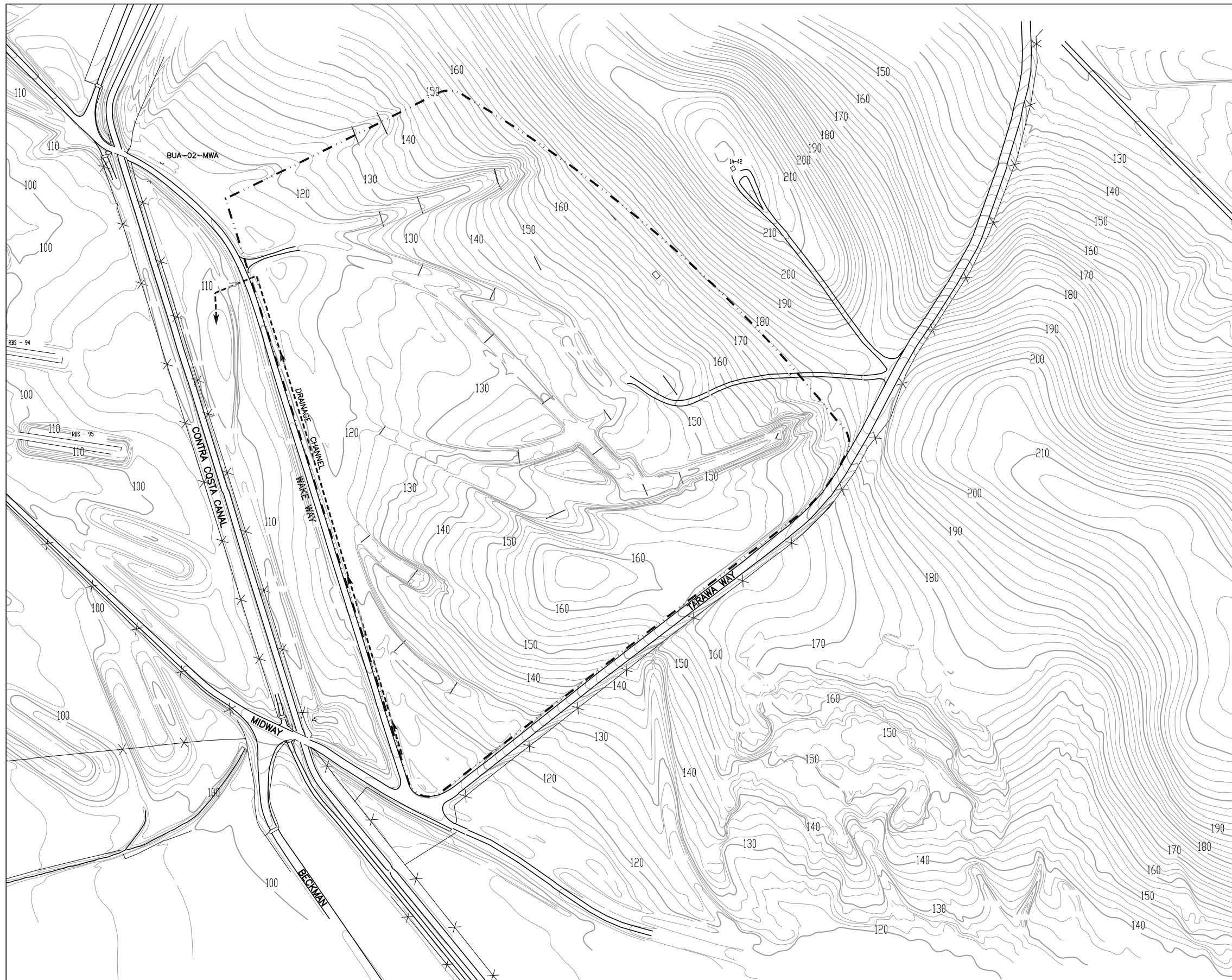


NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA

FIGURE 1
FACILITY VICINITY MAP



KCH (SF) (069-141) SITE13.DWG 08/20/98 L1SCALE:PTA ABC



LEGEND:

- x — FENCE
- ← - - - DRAINAGE CHANNEL (WITH ARROW INDICATING FLOW DIRECTION)
- 190 — GROUND SURFACE ELEVATION CONTOUR (FT MSL)
- - - SITE BOUNDARY
- TRENCHES

250 0 250 500
SCALE IN FEET

NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA

FIGURE 3
SITE 13 - BURN AREA
SITE FEATURES

Figure 4

This detailed station map has been deleted from the Internet-accessible version of this document as per Department of the Navy Internet security regulations.

it is believed that the upper 30 to 80 feet of sediments consist of discontinuous sand and gravel layers surrounded by a silt and clay matrix. Depth to groundwater within these units is variable, and locally perched conditions appear to exist. A regionally continuous sand and gravel layer lies beneath the upper fine-grained sediments. Groundwater in this zone is under confined conditions, although it appears to be semiconfined to unconfined near the base of Los Medanos Hills near Site 17.

Although groundwater in this area meets the definition of a source of potable water, it is not used as such; potable water is provided exclusively from treated surface water sources (PRC Environmental Management, Inc. [PRC] 1995b). Water supply wells near Naval Weapons Station SBD Concord include a well located at the Diablo Creek Golf Course that is used to supply water to the ponds and wells located at Mallard Reservoir. These wells are located more than a mile away from Sites 13 and 17.

2.1.3 Local Hydrology

The Inland Area lies within the Mount Diablo-Seal Creek hydrologic watershed. The principal drainage for this watershed is Mount Diablo Creek, which is known as Seal Creek after it enters Naval Weapon Station SBD Concord. Flow in Seal Creek along the Inland Area is intermittent and occurs primarily during the winter rainy season. Historical records show that some degree of flooding occurs during years of normal precipitation along portions of the creek near the Tidal Area. However, the section of the creek that runs through the Inland Area is not a source of severe overbank flooding because the channel is deeply incised.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The following sections discuss the background of Sites 13 and 17 and summarize the environmental investigations that have taken place at Naval Weapon Station SBD Concord. Sites 13 and 17 are not the subject of any CERCLA enforcement order or other enforcement activity.

2.2.1 Background

In December 1942, the Navy commissioned the ordnance shipping depot at Naval Magazine, Port Chicago, now known as the Tidal Area of Naval Weapon Station SBD Concord. When munitions passing through the Port Chicago waterfront began to exceed the capacity of the facility, the Navy acquired a 5,143-acre parcel of land in the Diablo Creek Valley. This land became the Inland Area of Naval Weapon Station SBD Concord.

Currently, operations at Naval Weapon Station SBD Concord are associated primarily with routine ammunition transshipment and storage. At present, the facility's current active tenant, the U. S. Army, confines these activities for the most part to the Tidal Area. The Inland Area is in a transition phase and is now mostly inactive, with no immediate plans to resume active operations. Although the Army controls daily site activities, the Navy retains responsibility for environmental restoration at the facility.

Former operations in the Inland Area included receiving both containerized and break-bulk munitions for inspection and classification. Munitions were held while they awaited transportation and were outloaded. Five magazine groups for ammunition storage were used within the Inland Area. The Inland Area also housed several production support facilities for weapons, as well as vehicle maintenance facilities. The northwest corner of the Inland Area included an administrative complex, the public works department, and personnel housing that were used to support the munitions operations. The 162-acre public golf course (of which 80 acres are owned by the city of Concord) remains active. A Weapons Quality Engineering Center was located between State Route 4 and Willow Pass Road, and an abandoned airfield south of State Route 4 was used to train forklift operators. Approximately 1,000 acres of pastureland in the Inland Area are currently leased for cattle grazing (Tetra Tech EM Inc. [TtEMI] 1997). There are no current plans for any changes in ownership of the Inland Area or in land use.

Site 13 - Burn Area

The Burn Area is located in the western portion of the Inland Area between the former Landing Field and Kinne Boulevard (Figure 2), and within the area bounded on the west by Wake Way and on the southeast by Tarawa Way (Figure 3). The Contra Costa Canal runs parallel to Wake Way along the west side of the road.

From the late 1940s to approximately 1974, portions of the approximately 1,100- by 1,400-foot area were used for the destruction of live ordnance. Ordnance was destroyed by open burning in large, excavated trenches and natural gullies at the site. The initial assessment study (IAS) indicated that ordnance burned at the site might have included flares, smoke chemicals, Thermite generators, small-arms ammunition, powder, and loose material cleaned from ammunition ships. Mark 1 and Mark 13 flares also might have been burned or buried in the burn pit. The powder from several thousand 5-inch rockets and photoflash cartridges might have been burned. In 1947, a "large quantity of smoke chemicals" (sulfur trioxide and chlorosulfonic acid) might have been disposed of at the site. An estimated 500,000 pounds of explosives (both black and smokeless powder) were reportedly destroyed at this site from 1967 to 1969. Estimates

of the amount of materials destroyed during other periods are not available, however. Residual material from ordnance burning was reportedly removed and disposed of off site (TtEMI 1997).

Site 13 was also used for other purposes. The area was used briefly as a fire-fighting training area, where napalm and fuel oil were ignited and extinguished by firefighters. Napalm is a general term for jellied gasoline and consists of a mixture of gasoline and aluminum soap powder or polystyrene. Explosive ordnance disposal personnel from Naval Weapon Station SBD Concord also stated that target practice with 50-caliber machine guns had been conducted at the site (TtEMI 1997).

Site 17 - Building IA-24

Building IA-24 is located along the eastern side of Kinne Boulevard, about 3 miles from the front gate (Figure 2). Buildings IA-24, IA-24A, and IA-24B and the surrounding areas (Figure 4) were formerly used for forklift maintenance and battery recharging. An asphalt parking lot for forklift storage was located along the southeastern wall of Building IA-24. Forklifts and batteries were steam cleaned to remove oil and grease. The steam cleaning area, last used in 1988, discharged condensate, oil, and grease through a pipeline from the southwestern side of Building IA-24 into Seal Creek (Figure 4).

Accounts differ on the possible existence of an earthen sump for disposal of battery acid that was reportedly present in the area. However, there is no official documentation on the existence or use of an acid sump. Extensive sampling revealed no residual contamination or other evidence of its existence in the area of the reported sump (TtEMI 1997).

The unpaved area between Buildings IA-24 and IA-55 was used for parking trucks. A 1,000-gallon diesel underground storage tank (UST) was located near the northwest corner of Building IA-55, and a 2,000-gallon diesel UST was located west of Building IA-24 (Figure 4). There was no evidence of petroleum leaks from either UST. Both USTs were replaced with aboveground tanks in 1997.

2.2.2 Environmental Investigations at Naval Weapon Station SBD Concord

This section presents an overview of environmental investigations and cleanups conducted by the Navy at Naval Weapon Station SBD Concord. Regulatory agencies that have been actively involved in overseeing the environmental work include the U.S. EPA, the California Department of Toxic Substances Control (DTSC), the Regional Water Quality Control Board (RWQCB), the U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, the California Department of Fish and Game, and the Contra Costa County Environmental Health Division.

An IAS conducted in 1983 under the Navy's Installation Restoration Program (IRP) identified 26 sites at Naval Weapon Station SBD Concord that could present a risk to human health or the environment. Of these sites, 13 were identified as potentially contaminated and were recommended for further investigation. The remaining sites were proposed for no action. Included in these initial 13 sites were three sites in the Inland Area (Sites 13, 14, and 16).

In 1987, Site 16 was removed from the IAS list and Site 27 was added. The three sites in the Inland Area that were designated during the IAS (Sites 13, 14, and 27), as well as eight additional Inland Area sites that were identified after the confirmation study, were investigated further during site investigations (SI) completed in 1984 and 1993 (PRC 1993). When the SI was completed, Inland Area Sites 8, 23A, 23B, and 24B were recommended for no further action. Portions of Site 13, Site 14, and Site 19 were proposed for immediate action or removals.

Inland Area Sites 13, 17, 22, 24A, and 27 were recommended for an RI when the SI was completed. Site 24A, the Pistol Firing Range, is a small arms range that was initially identified and investigated under the IRP. Base security forces currently use the pistol range for periodic exercises. No action is proposed at this time because the site is currently considered active.

Based on the findings of the SI and subsequent targeted investigations, soils contaminated with what appeared to be a residue from burning napalm were excavated in October 1997 from an area of former burning operations at Site 13 (TtEMI 1998a). Results of the HHRA conducted after excavation was complete indicate that the napalm residue and any related constituents that might pose a risk to human health or the environment have been removed. The results of the confirmation sampling event are further discussed in Section 2.5.1.

At Site 17, two additional rounds of groundwater sampling and analysis were conducted after the RI to specifically evaluate groundwater for contamination by bis(2-ethylhexyl)phthalate.

Bis(2-ethylhexyl)phthalate was not detected in either groundwater monitoring event (TtEMI 1998b).

Based on a review by the U.S. EPA and DTSC of the RI and agreements reached during the remedial project manager (RPM) meetings up until that time, the Navy pursued a no further action ROD for Sites 13, 17, 22, and 27. A draft ROD was completed on August 24, 1998 and a draft proposed plan was prepared in March 1999. Public review and comment started on March 19, 1999, and ended on April 19, 1999. A public meeting was held on April 5, 1999. A final proposed plan was completed in May 1999. A draft final ROD was completed in June 1999, and a final ROD for Sites 13, 17, 22, and 27 was completed in August 1999. The Navy received comments from U.S. EPA on the final ROD on

October 20, 1999. Comments by the U.S. EPA raised issues that required significant additional work. Therefore, the Navy decided to prepare this no further action ROD for Site 13 and Site 17 to expeditiously close these two sites. The RODs for Site 22 and Site 27 require additional work and are being handled separately under the Navy's IRP. The appropriate remedial actions for Sites 22 and 27 will be documented in a separate, future ROD for these sites.

2.2.3 Estimation of Ambient Concentrations of Metals in Inland Area Soils

Ambient concentrations of metals in soils (also known as background concentrations) were estimated as part of the RI for the Inland Area sites. Ambient concentrations were estimated as a basis to assess whether the detection of a constituent indicates site-related contamination or may be attributed to naturally occurring or non-site related anthropogenic sources.

Before the estimation of ambient concentrations began, a conceptual model of the geology in the Inland Area was developed, and sites were grouped based on similar data. The concentrations of some metals displayed two distinct populations: one population corresponded to the data from Sites 17 and 24A, and another population was formed by the data from Sites 13 and 22. (Sites 22 and 24A are not discussed in this ROD.) Ambient sampling locations were identified to estimate ambient concentrations for the two groups. The locations were chosen in areas topographically upgradient from each site that were not affected by Navy operations or other industrial activities.

Statistical procedures were used to establish ambient concentrations of metals at the sites. The 95th and 99th percentiles of the distribution of the ambient data sets were identified to define a reasonable upper level of the ambient concentrations. The ambient concentration limits for metals in soils of the two groups of sites are presented in Table 1. The table includes the 2000 U.S. EPA Region 9 preliminary remediation goals (PRG) for residential use for comparison. As shown on the table, the estimated 95th percentile ambient limit for arsenic exceeds the residential cancer PRG but is less than the noncancer PRG. For Sites 13 and 17, ambient concentrations for molybdenum, selenium, and silver were set at the detection limit. That is, the metal was considered present at ambient levels if it was not detected in any sample. The detection limits established for these metals in the Quality Assurance Project Plan (included as Appendix I of the RI report [TtEMI 1997]) are listed in Table 1. For Site 17, the ambient concentration for thallium was also set at the detection limit. A detailed description of the statistical method used to estimate ambient concentrations is provided in Appendix A of the RI (TtEMI 1997).

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Navy formed a restoration advisory board (RAB) on July 20, 1995. The RAB is made up of members of the community and the Navy. Since it was formed, the RAB held regular public meetings until April 1999 to discuss the progress of environmental cleanup at Naval Weapon Station SBD Concord. The RAB has not met regularly since that time because of a lack of community interest. Other community involvement efforts for NWS SBD Concord have included legal notices, fact sheets, and press releases that have been published regarding the Naval Weapons Station SBD Installation Restoration Program.

The Inland Area RI report was completed in October 1997 (TtEMI 1997). The RI report was made available to the public through the administrative record located at Naval Weapon Station SBD Concord and the city of Concord public library. The proposed plan for Inland Area Sites 13, 17, 22, and 27, which identifies the preferred alternative (no action), was made available to the public in March 1999. The notice of availability for the proposed plan was also published in the *Contra Costa Times* at the beginning of the public comment period, which extended from March 19 through April 19, 1999. A public meeting was held on April 5, 1999. At this meeting, representatives from the Navy, Cal/EPA, and U.S. EPA answered questions about the proposed no action alternative for Sites 13, 17, 22, and 27 at Naval Weapon Station SBD Concord. The Navy responded in writing to comments received during the public comment period. These responses are presented in the responsiveness summary, which is Appendix A of this ROD. These community participation activities fulfill the requirements of Sections 113(k)(2)(B)(i-v) and 117(a)(2) of CERCLA. (As noted in Section 2.2.2, Sites 22 and 27 were included in the proposed plan and earlier versions of this ROD, but are now being addressed separately under the IRP.)

2.4 SCOPE AND ROLE OF THE NO ACTION ALTERNATIVE

The Navy identified 34 sites at Naval Weapons Station SBD Concord for inclusion in the Naval Weapons Station SBD Installation Restoration Program. The current phase of site activities is summarized below and is presented for each site in Table 2.

- At the IAS or SI stage, the Navy concluded, with regulatory agency concurrence, that no action was needed at 14 sites.
- Litigation Area sites were subject to a remedial action in accordance with a 1989 ROD. The remedial action was completed in 1996, and the Navy is currently conducting post-remediation monitoring and a 5-year review.
- The RI for three Tidal Area sites is under way.

TABLE 1
AMBIENT CONCENTRATIONS OF METALS IN SOILS
FOR INLAND AREA SITES 13 AND 17
NAVAL WEAPON STATION SBD CONCORD

Metal	Residential Soil PRG ^a (mg/kg)	Ambient Limit (mg/kg)	
		Site 13 ^b	Site 17 ^c
Aluminum	76,000	21,000 (23,000)	20,000
Antimony	31	0.9 (1.8)	1.2
Arsenic	0.39 (cancer)	10 (27)	7.3
	22 (noncancer)		
Barium	5,400	560 (660)	210
Beryllium	150	0.12 (0.16)	0.56
Cadmium	9 ^d	0.29 (0.50)	0.15
Chromium	210 ^e	62 (69)	55
Cobalt	4,700	25	24
Copper	2,900	65 (67)	64
Lead	400/150 ^f	33 (38)	18
Manganese	1,800	1,200 (1,500)	870
Mercury	23	0.17 (0.23)	0.14
Molybdenum	390	Detection limit (0.47 ^g)	Detection limit (0.47 ^g)
Nickel	150 ^d	100 - 130	86
Selenium	390	Detection limit (0.45 ^g)	Detection limit (0.45 ^g)
Silver	390	Detection limit (0.13 ^g)	Detection limit (0.13 ^g)
Thallium	5.2	1.9 (3.6)	Detection limit (0.43 ^g)
Vanadium	550	96 (100)	86
Zinc	23,000	99 (110)	83

Notes:

- a U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRG for residential land use (U.S. EPA 2000) unless otherwise noted.
- b The first value listed is the 95th percentile of the ambient data set and the value in parenthesis is the 99th percentile of the ambient data set.
- c The ambient limit presented is the maximum detected concentration after outliers were excluded.
- d Cal-modified PRG
- e The PRG for total chromium is based on an assumed 1:6 ratio of chromium VI to chromium III.
- f The U.S. EPA Region 9 residential PRG for lead is 400 mg/kg. The value of 150 mg/kg was derived using the California Department of Toxic Substances Control Lead Risk Assessment Model Version 7 (California Department of Toxic Substances Control 1999).
- g The value presented is the reporting limit goal listed in the Quality Assurance Project Plan, as presented in Appendix I of the remedial investigation report (Tetra Tech EM Inc. 1997).

mg/kg Milligram per kilogram
PRG Preliminary remediation goal

TABLE 2

CURRENT PHASE OF SITE ACTIVITIES

NAVAL WEAPONS STATION SBD CONCORD SITES

Site	Site Name	Phase
1	Tidal Area Landfill	Record of Decision
2	Tidal Area R Area Site	Remedial Investigation
3	Litigation Area Remedial Action Subsite (RASS) 2, Kiln Site	Post-remediation Monitoring
4	Litigation Area RASS 1, Allied Site A	Post-remediation Monitoring
5	Litigation Area RASS 1, Allied Site A	Post-remediation Monitoring
6	Litigation Area RASS 4, Coke Pile Site	Post-remediation Monitoring
7	1944 Explosion Docks	Initial Assessment Study, No Further Action
8	1944 Explosion Ryer Island	Site Investigation, No Further Action
9	Tidal Area Froid and Taylor Roads Site	Remedial Investigation
10	Nichols Road Site	Initial Assessment Study, No Further Action
11	Tidal Area Wood Hogger Site	Remedial Investigation
12	Port Chicago	Initial Assessment Study, No Further Action
13	Inland Area Burn Area	Record of Decision
14	Kinne Boulevard Wells	Site Investigation, Wells Closed, No Further Action
15	Railroad Classification Yard	Initial Assessment Study, No Further Action
16	Black Pit at Red Rock	Site Investigation, No Further Action
17	Inland Area Building IA-24	Record of Decision
18	Inland Area Building IA-25/ IA-20 ¹	Initial Assessment Study, No Further Action
19	Inland Area Seal Creek	Site Investigation, No Further Action
20	Old Homestead	Initial Assessment Study, No Further Action
21	Building 97 Fuel Tanks	Initial Assessment Study, No Further Action
22	Inland Area Building 7SH5	Remedial Investigation
23A	Inland Area Explosive Ordnance Disposal	Site Investigation, No Further Action
23B	Inland Area Eagles Nest Explosive Ordnance Disposal	Site Investigation, No Further Action
24A	Pistol Firing Range	Active facility, not currently under investigation
24B	Inland Area Aircraft Firing Range	Initial Assessment Study, No Further Action
25	Litigation Area, RASS	Post-remediation Monitoring
26	Litigation Area, RASS	Post-remediation Monitoring
27	Inland Area Building IA-20	Feasibility Study
28	Litigation Area, RASS	Post-remediation Monitoring
29	Inland Area, Building IA-25	Feasibility Study
30	Tidal Area Taylor Blvd. Bridge Disposal Site	Remedial Investigation
AOC 1	Tidal Area Area of Concern Number 1	Removal Action, Remedial Investigation
SWMUs	Inland Area SWMU Sites 1, 2, 5, 7, and 18	Groundwater Remedial Investigation

Note:

1 This site became Site 27, Inland Area Building IA-20.

- A ROD is being prepared for Site 1, the Tidal Area Landfill.
- An investigation of groundwater in the Inland Area is being pursued near former solid waste management unit sites 1, 2, 5, 7, and 18.
- A remedial investigation is proposed for Site 22.
- Feasibility studies are proposed or are under way for Inland Area Sites 27 and 29. A Removal Action is proposed for Area of Concern Number 1 located near the Litigation Area sites.
- Although Site 24A was initially addressed in the RI, it has been removed from the Naval Weapons Station SBD Installation Restoration Program because of its status as an active pistol firing range.
- The risk assessments for Sites 13 and 17 (initiated in the RI and updated in this ROD) concluded that contaminants in soil and groundwater do not pose an unacceptable risk to human health and the environment assuming future residential or industrial land use. Therefore, the Navy concluded that these sites do not require further investigation or cleanup actions.

2.5 SITE CHARACTERISTICS

This section summarizes the results of the chemical characterization of soil and groundwater conducted during the SI (PRC 1993), RI (TtEMI 1997), and other related investigations at Sites 13 and 17 (TtEMI 1998a).

Soil and groundwater were sampled at Sites 13 and 17 in 1992 during the SI to evaluate environmental conditions and determine if the sites were appropriate for further action, for immediate action or removal, or for no further action. Site 13 was deemed appropriate for both further investigation and immediate action or removal. Site 17 was deemed appropriate for further investigation.

Soil and groundwater were sampled during the RI from April 1995 to June 1995, and groundwater was sampled again in September 1995, to evaluate environmental conditions and to assess the need for cleanup actions at the sites. Two additional groundwater samples were collected at Site 13 on May 16, 2000, to evaluate anomalously high concentrations of manganese detected in a sample from an upgradient background well during an earlier sampling event. Soils at Site 13 that contained napalm residues were excavated in October 1997, and confirmation samples were collected after the removal action (TtEMI 1998a).

The RI report compared the analytical results with the 1995 U.S. EPA Region 9 PRGs current at that time (U.S. EPA 1995) during the evaluation of the environmental conditions at the Inland Area sites. These comparisons were used to help delineate site-related contamination and focus the discussion of chemical characterization in the report. The discussion in the following sections has been updated using the most current PRGs, issued in November 2000 (U.S. EPA 2000).

2.5.1 Site 13 - Burn Area

During the SI, a 3- to 5-inch layer of a semisolid, dark honey-colored material was encountered during trenching in one of the gullies at the site. The visible surface extent of the material, which was tentatively identified as napalm residue, was approximately 70 square feet. Investigation during the SI found high concentrations of volatile organic compounds (VOC) in the air, as measured by photoionization detector, at locations where the napalm residue was lifted from the ground.

Further investigation of Site 13 was recommended based on the results of the SI. Soil and groundwater samples were collected at Site 13 during the RI and subsequent sampling events to assess whether historical ordnance burning had contaminated environmental media at the site. Soil sampling focused on gullies where burning is known to have taken place, in drainage channels, and at unbiased grid locations. Three monitoring wells were installed at the site during the RI, and two rounds of groundwater sampling were conducted. Analytes detected in soils and groundwater during the SI and RI are presented in Tables 3, 4, and 5.

VOCs, semivolatile organic compounds (SVOC), total petroleum hydrocarbons (TPH), and metals were detected in soils (Tables 3 and 4). Benzo(a)pyrene (an SVOC) was detected in two trench samples at concentrations above the U.S. EPA Region 9 residential PRG of 0.062 milligrams per kilogram (mg/kg). The concentration of benzo(a)pyrene was 0.07 mg/kg at location BUATP033 in a sample collected at a depth of 0.5 feet. The sample, along with two others, was obtained from a test pit; the other two samples were collected at depths of 2.5 and 4.0 feet. Benzo(a)pyrene was not detected in the deeper soil samples from this pit. Benzo(a)pyrene was also detected at a concentration of 0.27 mg/kg in a sample collected at a depth of 1.75 feet from location BUATP025. This location was also sampled at depths of 0.5 and 3.0 feet; benzo(a)pyrene was not detected in these samples. These findings suggest that benzo(a)pyrene detected at the site is localized and is associated with relatively small volumes of soil. No other SVOC or VOC was detected in soils collected at the site at concentrations above its residential PRG. Petroleum

TABLE 3
ORGANIC CONSTITUENTS DETECTED IN SOILS AT SITE 13
NAVAL WEAPON STATION SBD CONCORD

	Detected Analyte^a	Residential Soil PRG^b (mg/kg)	Maximum Detected Concentration^c (mg/kg)
VOC	Chloroform	0.24	0.001
	Toluene	520 ^d	0.0023
	Xylenes (total)	210 ^d	0.006
SVOC	Benzo(a)pyrene	0.062	0.27^e
	Benzo(b)fluoranthene	0.62	0.45
	Benzo(e)pyrene	2,300 ^f	0.021
	Benzoic acid	100,000 ^g	0.031
	2-Chlorophenol	63	0.19
	Chrysene	62	0.21
	2,4-Dinitrotoluene	120	0.12
	Fluoranthene	2,300	0.031
	2-Methylnaphthalene	56 ^h	0.074
	Naphthalene	56	0.075
	n-Nitrosodiphenylamine	99	0.063
	Phenol	37,000	1.9
	Pyrene	2,300	0.25
TPH	Diesel	Not established	5,500
	Motor oil	Not established	1,700

Notes:

- a Detected analytes are listed for all depth intervals sampled at Site 13 and are based on the samples collected during the site investigation and remedial investigation. The concentrations listed do not include samples collected in support of the October 1997 soil removal at the napalm trench (see text).
- b U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRG (U.S. EPA 2000) unless otherwise noted.
- c Concentrations shown in bold exceed the PRG. For all chemicals except xylenes (total), the maximum concentration was detected in the 0- to 10-foot depth interval.
- d The PRG is based on the soil saturation limit for the chemical and is not a health-based value. The health-based value would be greater than the soil saturation limit.
- e Of the 119 samples analyzed, concentrations of benzo(a)pyrene exceeded its residential PRG in two samples. As discussed in Section 2.5.1, these two samples were collected from different trenches, and concentrations of benzo(a)pyrene in nearby samples were less than the PRG.
- f A PRG is not available for benzo(e)pyrene; therefore, the PRG for pyrene is shown as a surrogate value.
- g The PRG of 100,000 mg/kg is a “ceiling limit” or “max” established by U.S. EPA Region 9 for relatively nontoxic chemicals when the health-based PRG is greater than 100,000 mg/kg.
- h A PRG is not available for 2-methylnaphthalene; therefore, the PRG for naphthalene is shown as a surrogate value.

mg/kg Milligram per kilogram
PRG Preliminary remediation goal
SVOC Semivolatile organic compound

TPH Total petroleum hydrocarbons
VOC Volatile organic compound

TABLE 4
INORGANIC CONSTITUENTS DETECTED IN SOILS AT SITE 13
NAVAL WEAPON STATION SBD CONCORD

Metal^a	Residential PRG^b (mg/kg)	Ambient Concentration^c (mg/kg)	Maximum Detected Concentration^d (mg/kg)
Aluminum	76,000	21,000 - 23,000	79,700^c
Antimony	31	0.9 - 1.8	84.2^f
Arsenic	0.39 (cancer) 22 (noncancer)	10 - 27	37.5^g
Barium	5,400	560 - 660	50,500^h
Beryllium	150	0.12 - 0.16	1.2
Cadmium	9 ⁱ	0.29 - 0.50	15.7^j
Chromium	210 ^k	62 - 69	546^l
Cobalt	4,700	25	68.5
Copper	2,900	65 - 67	2,090
Lead	400/150 ^m	33 - 38	5,590ⁿ
Manganese	1,800	1,200 - 1,500	5,150^o
Mercury	23	0.17 - 0.23	6.20
Molybdenum	390	Detection limit (0.47 ^p)	2.2
Nickel	150 ^f	100 - 130	361^q
Selenium	390	Detection limit (0.45 ^p)	0.66
Silver	390	Detection limit (0.13 ^p)	140 ^r
Thallium	5.2	1.9 - 3.6	3.60
Vanadium	550	96 - 100	145
Zinc	23,000	99 - 110	4,570

Notes:

- a Detected metals are listed for all depth intervals sampled at Site 13 and are based on samples collected during the site investigation and remedial investigation. The concentrations listed do not include samples collected in support of the October 1997 soil removal at the napalm trench (see text).
- b U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRG (U.S. EPA 2000) unless otherwise noted.
- c The estimated ambient concentration is expressed as a range. The lower value is the 95th percentile of the ambient data set, and the higher value is the 99th percentile of the ambient data set.
- d Concentrations shown in bold exceed the PRG.
- e The concentration of aluminum exceeded the PRG in only one sample (sample location BUA-09-TP at 0.5 to 1 foot). The only other chemical detected at a concentration that exceeded its PRG in this sample was barium, at a concentration of 50,500 mg/kg.
- f The concentration of antimony exceeded the PRG in only one sample (sample location BUATP024C at 0.25 feet). The other chemicals detected at a concentration that exceeded PRGs in this sample were lead, at a concentration of 5,590 mg/kg, and manganese, at a concentration of 1,890 mg/kg.
- g The maximum concentration of arsenic was detected in the 25 to 25.5-foot depth interval. The maximum concentration detected in the 0- to 10-foot depth interval was 19.7 mg/kg.
- h The concentration of barium exceeded the PRG in two samples. The concentration in the sample at 0.5 to 1 foot from location BUA-09-TP was 50,500 mg/kg, and the concentration in a sample at 3-foot from location BUATP039C was 18,300 mg/kg. Other chemicals detected at a concentration that exceeded the PRGs at location BUA-09-TP were aluminum (79,700) and lead (1,330); the concentration of lead at location BUATP039C was 3,090 mg/kg.

TABLE 4 (CONTINUED)

INORGANIC CONSTITUENTS DETECTED IN SOILS AT SITE 13 NAVAL WEAPON STATION SBD CONCORD

Notes: (continued)

i	Cal-modified PRG
j	The concentration of cadmium exceeded its PRG in only one sample (sample location BUASB002 at 0 to 1 foot). The only other chemical detected at a concentration that exceeded the PRG in this sample was lead, at a concentration of 467 mg/kg.
k	The PRG for total chromium is based on an assumed 1:6 ratio of chromium VI to chromium III.
l	The concentration of chromium exceeded its PRG in only one sample (sample location BUATP027C at 2 feet). The concentration of nickel (244 mg/kg) also exceeded the PRG at this location.
m	The U.S. EPA Region 9 residential PRG for lead is 400 mg/kg. The value of 150 mg/kg was derived using the California Department of Toxic Substances Control Lead Risk Assessment Model Version 7 (DTSC 1999).
n	Lead was detected at levels exceeding its residential PRG of 150 mg/kg in seven of 150 samples analyzed. Other chemicals with elevated concentrations collocated with elevated concentrations of lead were antimony, barium, cadmium, and manganese (see footnotes f, h, j, and o).
o	The maximum concentration of manganese was detected at an ambient location (location BUASBG05). Manganese was detected at concentrations that exceeded its residential PRG in two site samples (location BUATP024C at 1,890 mg/kg, and location BUATP027B at 3,090 mg/kg.) The concentrations of antimony (84.2 mg/kg) and lead (5,590 mg/kg) exceeded the PRGs at location BUATP024C, and the concentration of nickel (361 mg/kg) exceeded the PRG at location BUATP027B.
p	The value presented is the reporting limit goal listed in the Quality Assurance Project Plan in Appendix I of the remedial investigation report (Tetra Tech EM Inc. 1997).
q	Nickel was detected at concentrations that exceeded its residential PRG in four samples. The concentrations of chromium and manganese were elevated in two of these samples (see footnotes l and o).
r	The maximum concentration of silver was detected at an ambient location. Concentrations in all other samples were less than the PRG.
mg/kg	Milligram per kilogram
PRG	Preliminary remediation goal

TABLE 5

**ORGANIC AND INORGANIC CONSTITUENTS DETECTED IN GROUNDWATER AT SITE 13
NAVAL WEAPON STATION SBD CONCORD**

Detected Analyte		Tap Water PRG ^a (mg/L)	Maximum Detected Concentration (mg/L) ^b			
			July and August 1992 ^c	June 1995 ^d	September 1995 ^d	May 2000 (Well MW-10)
VOCs	None detected	Varies	None detected	Not detected	Not detected	Not analyzed
SVOCs	4-Methylphenol	180	Not analyzed	Not detected	6.0	Not analyzed
Explosives	None detected	Varies	Not detected	Not detected	Not detected	Not analyzed
TPH	TPH-diesel	None established	Not detected	120	100	Not analyzed
Inorganic Analytes	Aluminum	36,000	Not detected	575	849	67.1
	Barium	2,600	31.1	299	262	92.4
	Chromium ^c	55,000/110/0.16 ^f	Not detected	23	Not detected	16.4
	Cobalt	2,200	Not detected	Not detected	Not detected	Not detected
	Lead	None established	Not detected	1	Not detected	Not detected
	Manganese	880	18.9	1,210	3,130^g	245
	Molybdenum	180	Not detected	97	28	24.7
	Selenium	180	13.5	15	Not detected	7.4
	Thallium	2.4	Not detected	2	Not detected	Not detected
	Vanadium	260	8.9	11	12	Not detected
	Zinc	11,000	40	Not detected	Not detected	6.5
	Nitrate	10,000	Not analyzed	9,600	3,000	Not analyzed
	Nitrate/nitrite	10,000/1,000 ^h	10,500ⁱ	Not analyzed	Not analyzed	Not analyzed

TABLE 5 (CONTINUED)

ORGANIC AND INORGANIC CONSTITUENTS DETECTED IN GROUNDWATER AT SITE 13

NAVAL WEAPON STATION SBD CONCORD

Notes:

- a U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRG for residential land use (U.S. EPA 2000), unless otherwise noted.
- b Concentrations shown in bold exceed the PRG.
- c Maximum detected concentration reported in the site investigation (PRC 1993).
- d Maximum detected concentration reported in the remedial investigation for the two sampling periods (TtEMI 1997).
- e The chromium results were reported for total chromium.
- f The U.S. EPA Region 9 PRG is 55,000 µg/L for chromium III and 110 µg/L for chromium VI; the Cal-modified PRG for chromium VI is 0.16 µg/L.
- g Manganese was detected at a concentration that exceeded its tap water PRG in one of 16 samples analyzed.
- h The U.S. EPA Region 9 PRG is 10,000 µg/L for nitrate and 1,000 µg/L for nitrite.
- i Analyses for nitrate/nitrite were reported for only two samples, both collected in 1992 from monitoring well BUAMW002. Samples collected from this well in 1995 were analyzed separately for nitrate and nitrite. Nitrite was not detected (at a detection limit of 30 µg/L) and the maximum detected concentration of nitrate was 3,500 µg/L.

µg/L	Microgram per liter
PRG	Preliminary remediation goal
SVOC	Semivolatile organic compound
TPH	Total petroleum hydrocarbons
VOC	Volatile organic compound

hydrocarbons detected at Site 13 are at locations that are strongly correlated with the former burning operations conducted in the trench excavations at Site 13. TPH as motor oil (TPH-mo) was detected at low concentrations in three surface soil samples from the drainage channel.

Several metals were detected in samples of soil and sediment collected at the burn area at concentrations above residential PRGs. However, these metals were detected infrequently and at concentrations that exceeded both ambient limits and residential PRGs. The maximum detected concentrations of the metals are listed in Table 4 and concentrations that exceed PRGs are shown in bold. Aluminum, antimony, barium, cadmium, manganese, and nickel were each detected in one or two of the approximately 150 samples analyzed at concentrations that exceeded residential PRGs. As noted in the footnotes to Table 4, the elevated concentrations of metals were often collocated, particularly with lead. Lead was detected in samples collected at 133 locations; concentrations in seven samples exceeded the residential PRG of 150 mg/kg, derived using DTSC's Risk Assessment Spreadsheet Model Version 7.

Concentrations of lead in samples from two trench locations (5,590 mg/kg at location BUATP024C and 3,090 mg/kg at location BUATP039C) were well above the U.S. EPA Region 9 industrial PRG of 750 mg/kg. Additional samples were collected close to these locations. The analytical results from this sampling did not confirm the presence of high concentrations of lead in these areas, and no definable area of lead contamination was identified. The concentrations of lead in the confirmation samples ranged from 4.9 to 235 mg/kg.

Of the 149 detections of nickel, only four exceeded the residential PRG of 150 mg/kg. Arsenic was the only metal that was detected at concentrations that consistently exceeded its residential cancer PRG (all 129 concentrations of arsenic detected exceeded 0.39 mg/kg); however, all concentrations of arsenic in samples collected within the 0- to 10-foot depth interval were less than its established ambient limit (10 to 27 mg/kg), so that the presence of arsenic is not attributed to site activities. The RI concluded that there is no clear spatial pattern of metals at Site 13 and no evidence to suggest that metals are being transported off site. A comprehensive discussion of the soil investigation and nature and extent of the chemicals detected is presented in the RI report (TtEMI 1997).

No organic compounds were detected in samples collected in the SI or the first round of groundwater sampling conducted during the RI in June 1995 (Table 5). TPH as diesel (TPH-d) and 4-methylphenol were detected in samples from at least one well during the second-round groundwater sampling. No other organic compound was detected in groundwater samples collected at the site.

During sampling and analysis for the 1995 RI, the maximum concentration of manganese detected in samples collected in June (1,210 µg/L) and September (3,130 µg/L) were the only results for metals in groundwater that exceeded a residential tap water PRG. These concentrations were detected in samples from monitoring well MW10. All groundwater samples collected in 1995 were analyzed at the laboratory without filtration to remove suspended particles of soil. In contrast, samples collected in 1992 were filtered in the field before they were analyzed at the laboratory. A review of the data presented in Table 5 shows that concentrations of metals measured in groundwater in 1992 were significantly lower for most analytes, suggesting that turbidity had a strong influence on the results. Well MW-10 was sampled again in May 2000 using a low-flow purging technique to minimize suspended particulate matter. The concentration of manganese was more than 12 times less than the maximum concentration reported from the 1995 sampling event, suggesting that the elevated concentrations were the result of turbidity or other artifacts. In addition, no soil sample collected from the boring at well MW10 contained elevated concentrations of manganese. These findings suggest that the elevated concentrations of manganese detected during the June and September 1995 sampling events were not the result of a release from the site.

Based on the findings of the SI, the Navy decided to excavate soils contaminated with napalm residue. The residue and underlying contaminated soils were excavated from the former burn areas in October 1997. Because the only contamination was from petroleum hydrocarbons, the Navy, with concurrence of the U.S. EPA, DTSC, and RWQCB, submitted a work plan to RWQCB and subsequently completed soil cleanup. Approximately 23 cubic yards of contaminated soil and napalm residue was disposed of off site (TtEMI 1998a). The samples collected during the RI at locations BUATP025 and BUATP033 that contained benzo(a)pyrene at concentrations greater than the PRG were not collocated with the napalm residues; soils at these areas were therefore not removed as part of this action.

Results for samples collected after excavation was complete indicate that the napalm residue and related constituents are no longer present at the site at concentrations that exceed risk-based screening levels and residential PRGs. The removal of the soil from the trench reduced the levels of TPH to less than 100 mg/kg (TtEMI 1998a). Table 6 presents the results for post-excavation confirmation samples collected in October 1997 (analyzed for TPH and VOCs) and February 1998 (analyzed for SVOCs).

TABLE 6

**ORGANIC CONSTITUENTS DETECTED IN SOIL CONFIRMATION SAMPLES
COLLECTED AFTER THE NAPALM RESIDUE REMOVAL AT SITE 13
NAVAL WEAPON STATION SBD CONCORD**

Analyte	Maximum Detected Concentration (mg/kg)			
	October 1997		February 1998	
	Sample Depth 0.75 - 1.0 feet	Sample Depth 2.75 - 3.00 feet	Sample Depth 0.5 - 0.75 feet	Sample Depth 2.0 - 2.5 feet
TPH-d	31	< 10	--	--
TPH-mo	52	< 34	--	--
Benzene	0.012	< 0.0005	--	--
Toluene	0.004	< 0.0005	--	--
Ethylbenzene	0.001	< 0.0010	--	--
Xylene	0.005	< 0.0005	--	--
SVOC	--	--	Not detected	Not detected

Notes:

mg/kg Milligram per kilogram

SVOC Semivolatile organic compound

TPH-d Total petroleum hydrocarbon as diesel

TPH-mo Total petroleum hydrocarbon as motor oil

-- Not analyzed

2.5.2 Site 17 - Building IA-24

Soil, sediment, and groundwater were sampled at Site 17 to evaluate the nature and extent of chemicals present as a result of past site activities, including forklift maintenance and use of USTs. Sampling focused on the areas of the suspected sump for disposal of battery acid, a steam-cleaning pad with an outfall to Seal Creek, a fuel UST at Building IA-55, and the site drainage channels (Figure 4). A suspected sump for disposal of battery acid was alleged to be present at the site, but observations during field sampling and the subsequent analytical laboratory results did not find any evidence to suggest its actual existence.

In addition to CERCLA activities, the Navy investigated the septic system under the Resource Conservation and Recovery Act. Five monitoring wells were installed at the site during the RI. Two rounds of groundwater samples were collected during the RI, and two additional rounds of groundwater sampling and analysis were conducted after the RI.

SVOCs were detected in soil samples at concentrations below PRGs, with one exception (Table 7). Benzo(a)pyrene was detected in three of 26 samples; of these, concentrations exceeded the residential PRG in two surface soil samples collected from a drainage ditch (sample locations ACSSB039 and ACSSB040). Results for all other samples were reported as not detected, although detection limits (ranging from 0.11 to 0.44 mg/kg) were elevated compared with the PRG of 0.062 mg/kg. Only surface samples were collected at these locations, and no other samples had been collected from the trench. However, the two concentrations detected (0.073 and 0.44 mg/kg) of benzo(a)pyrene are comparable to levels commonly reported for urban and rural soils (Agency for Toxic Substances and Disease Registry [1995]), which suggests that the concentrations detected are not the result of a release. No petroleum hydrocarbons were detected in samples collected near the fuel USTs. The maximum concentration of TPH-mo (1,300 mg/kg) in soil was detected in a sample collected from a drainage ditch, and the maximum concentration detected in sediment (4,100 mg/kg) was detected in a sample collected at Seal Creek. No VOCs or SVOCs were detected in sediments. Inorganic chemicals were not identified above ambient levels in soil samples collected near the drainage ditches.

Three metals were detected in samples of soil and sediment collected in the 0- to 10-foot depth interval at concentrations that exceeded the 2000 PRGs (Table 8). Arsenic was detected in almost all soil samples at concentrations that exceeded its residential PRG; however, concentrations in all samples were less than the established ambient limit of 7.3 mg/kg so that the presence of arsenic is not attributed to site activities. Lead was detected in samples collected at two locations at concentrations that exceeded its LeadSpread PRG of 150 mg/kg; the maximum detected concentration was 225 mg/kg. Nickel was detected in samples collected at 48 locations. Concentrations in seven samples exceeded the residential PRG; five were collected from depths of 19 feet and greater, one was from a depth of 9.5 feet, and one was from a depth of 5 feet. In all cases, concentrations of nickel in nearby samples were less than the PRG. The lack of a pattern in the spatial distribution of samples that contained elevated concentrations of nickel suggests that nickel is not present as a result of a site release. Table 8 lists all metals detected in soil and sediment samples at Site 17 and the ambient and PRG values. Infrequent detections of metals at concentrations above ambient and PRG values indicate that there is no clear spatial pattern of metals on site and no evidence to suggest that metals are being transported off site. A comprehensive discussion of the soil investigation and the nature and extent of the chemicals detected in soil and sediment is presented in the RI report (TtEMI 1997).

TABLE 7

**ORGANIC CONSTITUENTS DETECTED IN SOILS AT SITE 17
NAVAL WEAPON STATION SBD CONCORD**

Detected Analyte ^a		Residential PRG ^b (mg/kg)	Maximum Detected Concentration ^c (mg/kg)
SVOC	Benzo(a)anthracene	0.62	0.087
	Benzo(a)pyrene	0.062	0.11^d
	Benzo(b)fluoranthene	0.62	0.11
	Benzo(g,h,i)perylene	2,300 ^e	0.099
	Benzo(k)fluoranthene	0.61 ^f	0.13
	Chrysene	62	0.15
	Dibenz(a,h)anthracene	0.062	0.024
	Fluoranthene	2,300	0.16
	Indeno(1,2,3-cd)pyrene	0.62	0.083
	Phenanthrene	None established	0.07
	Phenol	37,000	0.76
	Pyrene	2,300	0.19
TPH	Diesel	None established	160
	Gasoline	None established	0.082
	Motor oil	None established	1,300

Notes:

- a Detected analytes are listed for all depth intervals sampled at Site 17.
- b U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRG (U.S. EPA 2000), unless otherwise noted.
- c Concentrations shown in bold exceed the PRG.
- d In 26 total samples analyzed, benzo(a)pyrene was detected in two surface soil samples at concentrations that exceeded its residential PRG. Subsurface samples were not collected at these locations, and data for nearby samples were not available. However, the detected concentrations of benzo(a)pyrene are comparable to concentrations detected in urban and rural soils in the U.S. (Agency for Toxic Substances and Disease Registry 1995).
- e A PRG is not available for benzo(g,h,i)perylene; therefore, the PRG for pyrene is shown as a surrogate value.
- f Cal-modified PRG

mg/kg	Milligram per kilogram	SVOC	Semivolatile organic compound	VOC	Volatile organic compound
PRG	Preliminary remediation goal	TPH	Total petroleum hydrocarbons		

TABLE 8
INORGANIC CONSTITUENTS DETECTED IN SOILS AT SITE 17
NAVAL WEAPON STATION SBD CONCORD

Metal^a	Residential PRG^b (mg/kg)	Ambient Concentration^c (mg/kg)	Maximum Detected Concentration^d (mg/kg)
Aluminum	76,000	20,000	30,000
Antimony	31	1.2	12.1
Arsenic	0.39 (cancer) 22 (noncancer)	7.3	6.5^e
Barium	5,400	210	390
Beryllium	150	0.56	0.95
Cadmium	9 ^f	0.15	3.1
Chromium	210 ^g	55	76.1
Cobalt	4,700	24	28.9
Copper	2,900	64	87.7
Lead	400/150 ^h	18	225ⁱ
Manganese	1,800	870	1,500 ^j
Mercury	23	0.14	0.45
Molybdenum	390	0.47 ⁱ	1.8
Nickel	150 ^f	86	165^l
Silver	390	0.45 ^k	24.5
Thallium	5.2	0.13 ^k	1.3 ^m
Vanadium	550	86	98.7
Zinc	23,000	83	255

Notes:

- a Detected metals are listed for all depth intervals sampled at Site 17 and are based on samples collected during the site investigation and remedial investigation, unless otherwise noted.
- b U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRG (U.S. EPA 2000), unless otherwise noted.
- c The ambient limit presented is the maximum detected concentration after outliers had been excluded.
- d Concentrations shown in bold exceed the PRG.
- e Arsenic was detected at levels that exceeded its residential PRG in 45 of the 48 samples analyzed.
- f Cal-modified PRG
- g The PRG for total chromium is based on an assumed 1:6 ratio of chromium VI to chromium III.
- h The U.S. EPA Region 9 residential PRG for lead is 400 mg/kg. The value of 150 mg/kg was derived using the California Department of Toxic Substances Control Lead Risk Assessment Model Version 7 (DTSC 2000).
- i Lead was detected at levels that exceeded its residential PRG in two of the 48 samples analyzed.
- j This maximum concentration of manganese was detected at a depth of 15 to 16 feet. The maximum concentration detected from 0 to 10 feet was 1,500 mg/kg (below its residential PRG).
- k The value presented is the Quality Assurance Project Plan reporting limit goal, as presented in Appendix I of the RI report (TtEMI 1997).
- l Nickel was detected at levels that exceeded its residential PRG in four of the 48 samples analyzed.
- m This maximum concentration of thallium was detected at a depth of 15 to 16 feet. The maximum concentration detected from 0 to 10 feet was 1.3 mg/kg (below its residential PRG).

mg/kg Milligram per kilogram
PRG Preliminary remediation goal

VOCs, SVOCs, and petroleum hydrocarbons have not been detected consistently in groundwater samples collected at the site. However, bis(2-ethylhexyl)phthalate, a common laboratory contaminant, was detected in samples from two wells at concentrations of 55 and 60 micrograms per liter (µg/L) during groundwater sampling in May 1995 (Table 9). Two additional groundwater monitoring events were conducted to evaluate whether the results for the samples collected during the RI were representative of actual groundwater conditions (TtEMI 1998b). Bis(2-ethylhexyl)phthalate was not detected in samples collected during either groundwater monitoring event following the RI. Based on these findings, the Navy concluded that bis(2-ethylhexyl)phthalate is not present in groundwater at Site 17.

TABLE 9
ORGANIC AND INORGANIC CONSTITUENTS DETECTED
IN GROUNDWATER AT SITE 17
NAVAL WEAPON STATION SBD CONCORD

Analyte	Residential Tap Water PRG (mg/L) ^a	Maximum Detected Concentration ^b (mg/L)			
		May 1995	September 1995	January 1998	April 1998
Aluminum	36,000	479	309	--	--
Barium	2,600	102	128	--	--
Chromium ^c	55,000/110/0.16 ^d	7.0	3.0	--	--
Manganese	880	34	15	--	--
Nickel	730	3.0	Not detected	--	--
Selenium	180	Not detected	5.0	--	--
Vanadium	260	5	5.0	--	--
Nitrate	10,000	4,400	6,100	--	--
Bis(2-ethylhexyl)phthalate	4.8	60^e	Not detected	Not detected	Not detected
TPH-Diesel (mg/L)	None established	0.3	0.06	--	--
TPH-Motor Oil (mg/L)	None established	0.1	Not detected	--	--

Notes:

- a U.S. Environmental Protection Agency (U.S. EPA) Region 9 PRG for residential land use (U.S. EPA 2000), unless otherwise noted.
- b Concentrations shown in bold exceed the PRG.
- c The chromium results were reported for total chromium.
- d The U.S. EPA Region 9 PRG is 55,000 µg/L for chromium III and 110 µg/L for chromium VI; the Cal-modified PRG for chromium VI is 0.16 µg/L.
- e Bis(2-ethylhexyl)phthalate exceeded its tap water PRG in two of 10 samples analyzed.
- µg/L Microgram per liter
- mg/L Milligram per liter
- PRG Preliminary remediation goal
- TPH Total petroleum hydrocarbons
- Not analyzed

2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Naval Weapon Station SBD Concord is an active base. Currently, industrial operations are associated primarily with routine ammunition transshipment and storage. The facility's current active tenant, the U.S. Army, confines these activities for the most part to the Tidal Area at Naval Weapons Station SBD Concord. The Inland Area is in a transition phase and is now mostly inactive, with no immediate plans to resume active operations. There are no current plans for changes in ownership or land use of Naval Weapon Station SBD Concord.

Although groundwater in this area meets the definition as a source of potable water, it is not used as such; instead, potable water is provided exclusively from treated surface water sources (PRC 1995b). Water supply wells near Naval Weapons Station SBD Concord include a well located at the Diablo Creek Golf Course that is used to supply water to the ponds and wells located at Mallard Reservoir. These wells are located more than a mile away from Sites 13 and 17.

2.7 SUMMARY OF SITE RISKS

The following sections summarize the results of the HHRAs and ERAs for Sites 13 and 17.

2.7.1 Human Health Risk Assessment

Decisions on the need for site remediation are based in part, on whether chemical contaminants at a site pose a significant risk to human health. Therefore, an HHRA was performed as part of the RI, using U.S. EPA Region 9 PRGs for industrial and residential soils to estimate potential risk. The HHRA evaluated potential risks to human health associated with exposure to soil, sediment, and groundwater at Sites 13 and 17 under current and future land use scenarios, assuming that no subsequent cleanup action will be taken.

Since 1997 when the HHRA was completed, the U.S. EPA Region 9 has revised the PRGs to reflect changes in risk assessment methodologies, reference doses, cancer slope factors, and exposure assumptions. As a result, the original estimates of risk presented in the RI have been revised using the updated PRGs (EPA 2000). These revised estimates are presented in this ROD.

Consistent with EPA and DTSC guidance on using Region 9 PRGs to assess risk (DTSC 1994, EPA 2000), a three-step process was used to assess risk at Sites 13 and 17. First, chemicals of potential concern (COPC) were identified. Second, an exposure assessment was performed. Third, cancer and

noncancer risks were quantified. Each of those steps, and their outcomes, is briefly described in the following subsections.

2.7.1.1 Identification of Chemicals of Potential Concern

COPCs are generally defined as chemicals present at a site as a result of a release. In the HHRA, COPCs were identified from analytical data generated from soil and groundwater samples collected during the SI, RI, and confirmation sampling at the napalm trench. All of the organic compounds detected in soil and groundwater were retained as COPCs. Chemicals eliminated as COPCs consisted of metals detected at concentrations within the range of ambient concentrations and elements considered essential for nutrition (calcium, iron, magnesium, potassium, and sodium.)

2.7.1.2 Exposure Assessment

Naval Weapon Station SBD Concord is not scheduled for closure or property transfer. There is no regular human activity at either Site 13 or Site 17. Future land use at these sites is not expected to change from its current use. Therefore, future residential, recreational, or private industrial or commercial use of the sites is not anticipated. Current and future receptors were identified based on current and projected future land use and activity patterns at each site. The most probable current and future receptors are base personnel for both sites. For the risk assessment, activities of base personnel were assumed to be similar to an industrial worker as defined within the PRG framework. The exposure pathways evaluated for an industrial worker within the PRG framework are incidental ingestion of soil, dermal contact with soil, and inhalation of airborne particles and VOCs released from soil.

A residential scenario was also evaluated for each site to assess an unrestricted land use scenario. Potential impacts to residents were assessed for three exposure pathways: incidental ingestion of soil, dermal contact with soil, and inhalation of airborne particles and VOCs released from soil. Exposure to chemicals in sediments was also evaluated for Site 17. Data for two depth intervals were evaluated for soil: a 0- to 0.5-foot depth interval, and a 0- to 10-foot depth interval. Residential exposure to chemicals in groundwater via ingestion was also evaluated. Although most private and city municipal water in the region is supplied by treated surface water sources, it was conservatively assumed that groundwater resources on the site could be developed as a supply of drinking water in the future.

2.7.1.3 Characterization of Risk

Noncancer risks (hazard quotients) were estimated for all COPCs, and potential carcinogenic risks were estimated for the carcinogenic COPCs. The hazard quotient for each COPC was estimated by dividing the exposure point concentration (EPC) by the noncancer-based PRG. The cancer risk for each carcinogenic COPC was estimated by dividing the EPC by the cancer-based PRG and multiplying the quotient by 10^{-6} . The PRGs were obtained from the U.S. EPA Region 9 (EPA 2000).

Nominally, the EPC was the 95 percent upper confidence limit of the arithmetic mean (UCL_{95}) of the measured concentrations. When the UCL_{95} exceeded the highest reported concentration, the highest concentration was used as the EPC.

Lead was evaluated by comparing the EPC for lead with the U.S. EPA Region 9 residential (400 mg/kg) and industrial (750 mg/kg) PRGs and with a PRG of 150 mg/kg derived using LeadSpread 7 (DTSC 1999.).

U.S. EPA guidance on the role of the HHRA in supporting risk management decisions is considered to aid in interpreting the results of the HHRA. According to the U.S. EPA directive, "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions" (U.S. EPA 1991),

Where cumulative carcinogenic site risk to an individual based on the reasonable maximum exposure for both current and future land use is less than 10^{-4} , and the noncarcinogenic hazard quotient is less than 1, action generally is not warranted unless there are adverse environmental impacts.

When it is concluded that action is warranted at a site (that is, the risks exceed 10^{-4}), remedial action goals defined by U.S. EPA are considered. U.S. EPA has defined general remedial goals for sites on the National Priorities List in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations Part 300.430). These goals include a target risk range, which is defined as "an excess upperbound lifetime cancer risk to an individual from exposure to site contamination of between 1×10^{-4} to 1×10^{-6} ," or between 1 in 10,000 and 1 in 1,000,000.

In general, action is not warranted at a site when the cancer risks associated with residential exposure at a site are below 10^{-4} . However, action may be proposed at a site where the risk is less than 10^{-4} based on site-specific conditions. Consequently, for completeness, carcinogenic risks within the NCP range of 10^{-4} and 10^{-6} are discussed in the summary of site risks. Chemicals are also identified when the risk for the chemical exceeds 10^{-6} . This information was reviewed to confirm that no site-specific conditions (that is, areas of localized contamination or potentially unidentified sources) warranted further investigation or remediation.

2.7.1.4 Results of Risk Characterization for Site 13

The results of the HHRA for Site 13 are summarized in Table 10. The COPCs evaluated, EPCs and PRGs used to conduct the risk assessment, and chemical-specific cancer risks and HIs are fully documented in Appendix B.

TABLE 10
RESULTS OF THE HUMAN HEALTH RISK ASSESSMENT FOR SITE 13
NAVAL WEAPON STATION SBD CONCORD

Receptor	Medium	Cancer Risk ^a	Hazard Index ^a
Resident	Surface soil (0 to 0.5 feet)	1×10^{-7}	0.5 ^b
	Subsurface soil (0 to 10 feet)	6×10^{-8}	0.6 ^c
	Groundwater	Not evaluated ^d	1 ^e
Industrial Worker	Surface soil (0 to 0.5 feet)	7×10^{-10}	0.2
	Subsurface soil (0 to 10 feet)	3×10^{-9}	0.2

Notes:

- a The results presented are for the reasonable maximum exposure case.
- b The hazard index (HI) presented is the highest segregated HI. The total HI for surface soil is 1.3.
- c The HI presented is the highest segregated HI. The total HI for subsurface soil is 1.4.
- d Cancer risk was not evaluated because no carcinogenic chemicals were detected in groundwater samples collected at Site 13.
- e The HI presented is the highest segregated HI. The total HI for groundwater is 2.8.

Soil

For both the resident and industrial worker receptors, the carcinogenic risks associated with exposure to chemicals detected in surface soils and subsurface soils are below 1×10^{-6} , the lower end of the target risk range (Table 10). The hazard indices (HIs) estimated for exposure to chemicals detected in samples from both soil depth intervals for the industrial worker receptor are less than the threshold value of 1. The highest segregated HIs for the resident receptor are well below the threshold value of 1 for both soil depth intervals.

The average (UCL₉₅) concentrations of lead in surface soil (106 mg/kg) and subsurface soil (33 mg/kg) are below the value calculated using DTSC's LeadSpread model (150 mg/kg) and the U.S. EPA Region 9 residential PRG (400 mg/kg). However, lead was detected in samples from two trench locations at concentrations (5,590 mg/kg and 3,090 mg/kg) well above the industrial PRG (750 mg/kg). Based on these findings, Site 13 was resampled in February 1996 to assess the extent of the lead detected previously.

Samples were collected close to the locations where the high concentrations of lead were detected. Analytical results from this sampling event did not confirm the presence of high concentrations of lead in this area, and no definable area of lead contamination was identified. The concentrations of lead in the confirmation samples ranged from 4.9 to 235 mg/kg. On the basis of these findings, concentrations of lead in soils at Site 13 do not pose an unacceptable risk to human health.

Groundwater

Carcinogenic chemicals were not detected in groundwater samples collected at Site 13.

The analytical data set used in the updated risk assessment was revised for manganese and nitrates and nitrites for the analysis of the HI. The 1997 HHRA reported an HQ of 1.8 for manganese at Site 13. This result was based on the maximum detected concentration for manganese, in a sample collected at monitoring well MW10 (3.1 mg/L), and the 1996 PRG of 1,700 µg/L. As discussed in Section 2.5.1, the elevated concentrations of manganese measured in the 1995 samples and used in the 1997 HHRA were believed to be a result of sample turbidity. Monitoring well MW-10 was resampled in May 2000 using a low-purging technique to minimize suspended particulate matter. Monitoring well MW-10 was selected for resampling because the highest concentration of manganese was detected in a sample from this well. The concentration of manganese measured in May 2000 was 245 µg/L. This concentration was used to represent the concentration of manganese at monitoring well MW-10 and the UCL₉₅ was recalculated, yielding an exposure point concentration of 70 µg/L.

Samples collected in June and September 1995 as part of the RI were analyzed separately for nitrate and nitrite on samples. The maximum detected concentration of nitrate was 9,600 µg/L; nitrite was not detected in any sample collected in 1995. Results also were reported for “nitrate/nitrite” in one sample collected from monitoring well BUAMW002 in 1992 as part of the SI. Because concentrations of nitrate and nitrite could be distinguished in the 1992 sample, the results were not included in the risk assessment. Separate data for nitrite and nitrate were reported for this location for samples collected in 1995, and these results were included in the data set for the risk assessment.

Based on the results of the reanalysis, the highest segregated HI was 1 for ingestion of groundwater under a residential scenario. The segregated HI was for changes in blood chemistry and was attributed to thallium.

Concentrations of lead in groundwater were less than the U.S. EPA drinking water action level of 15 µg/L.

Summary

The cancer risks for industrial workers and residents at Site 13 from potential exposures to soils and sediment are less than the lower end of the U.S. EPA target risk range that is considered protective of human health, and the HIs for noncancer effects are below 1, the level of concern. Concentrations of lead in soil are below the U.S. EPA Region 9 PRG. A cancer risk was not evaluated for groundwater because no carcinogenic chemicals were detected in groundwater samples collected at Site 13. The segregated HI for residential exposure to groundwater was 1.

2.7.1.5 Results of Risk Characterization for Site 17

The results of the HHRA for Site 17 are summarized in Table 11. The COPCs evaluated, EPCs and PRGs used to conduct the risk assessment, and chemical-specific cancer risks and HIs are fully documented in Appendix B.

TABLE 11

**RESULTS OF THE HUMAN HEALTH RISK ASSESSMENT FOR SITE 17
NAVAL WEAPON STATION SBD CONCORD**

Receptor	Medium	Cancer Risk ^a	Hazard Index ^a
Resident	Surface soil (0 to 0.5 feet)	3×10^{-6}	0.5 ^b
	Subsurface soil (0 to 10 feet)	3×10^{-6}	0.4 ^c
	Sediment	1×10^{-5}	0.4 ^d
	Groundwater	Not evaluated ^e	0.2
Industrial Worker	Surface soil (0 to 0.5 feet)	6×10^{-7}	0.2
	Subsurface soil (0 to 10 feet)	6×10^{-7}	0.2

Notes:

- a The results presented are for the reasonable maximum exposure case.
- b The hazard index (HI) presented is the highest segregated HI. The total HI for surface soils is 1.3.
- c The HI presented is the highest segregated HI. The total HI for subsurface soil is 1.2.
- d The HI presented is the highest segregated HI. The total HI for sediment is 1.4.
- e Cancer risk was not evaluated because no carcinogenic chemicals were detected in groundwater samples collected at Site 17.

Soil

For the industrial worker receptor, the carcinogenic risks associated with exposure to chemicals detected in surface soil (6×10^{-7}) and subsurface soil (6×10^{-7}) are less than the lower limit (1×10^{-6}) of the target risk range, and the HI (0.2) is below the threshold value of 1 (Table 11).

For a resident, the carcinogenic risk attributable to exposures to chemicals detected in surface soil (3×10^{-6}), subsurface soil (3×10^{-6}), and sediment (1×10^{-5}) are within the target risk range. The only chemical-specific risk that exceeded 1×10^{-6} for soil was associated with exposure to benzo(a)pyrene. Benzo(a)pyrene was detected in three of seven soil samples. The risk associated with benzo(a)pyrene was based on the maximum detected concentration of 0.1 mg/kg. This concentration is comparable to background levels in urban and rural soils (ATSDR 1995). For sediments, the risk associated with exposure to arsenic was the only chemical-specific risk that exceeded 1×10^{-6} . The EPC for arsenic of 5.7 mg/kg is the maximum concentration detected in sediment and is less than the ambient level established for arsenic in soil (7.3 mg/kg).

The highest segregated HIs associated with residential exposure to chemicals detected in surface soil (0.5), subsurface soil (0.4), and sediment (0.4) are below the threshold value of 1 (Table 11).

The EPCs for lead in surface soil (225 mg/kg) and subsurface soil (24 mg/kg) are below the U.S. EPA Region 9 residential PRG of 400 mg/kg and industrial PRG of 750 mg/kg, although the maximum concentration of lead detected at the site (225 mg/kg) is above the LeadSpread PRG of 150 mg/kg. Only two other samples (at concentrations of 153 and 157 mg/kg) contained lead at concentrations above this residential PRG. The EPC for lead in sediment (14.5 mg/kg) is less than the residential PRG for soil.

Groundwater

Bis(2-ethylhexyl)phthalate was detected in samples from two groundwater monitoring wells at Site 17. The risk assessment presented in the RI report indicated that the risk associated with residential exposure to this contaminant (6×10^{-6}) was within the target range. Two additional quarters of groundwater samples were collected in January and April 1998 to evaluate whether the samples collected during the RI were representative of actual groundwater conditions. Bis(2-ethylhexyl)phthalate was not detected in any of the groundwater samples collected in the 1998 quarterly groundwater monitoring events. Bis(2-ethylhexyl)phthalate is a common laboratory contaminant and has not been consistently detected in samples collected at Site 17. Based on these findings, bis(2-ethylhexyl)phthalate was eliminated from the list of chemicals evaluated in the HHRA. No other carcinogens were detected in groundwater at Site 17.

The HI estimated for residential exposure to groundwater is well below the threshold HI of 1, and lead was not detected in groundwater samples collected from monitoring wells at Site 17.

Summary

The cancer risks for industrial workers and residents at Site 17 from potential exposures to soils and sediment are within the U.S. EPA target risk range that is considered protective of human health, and the HIs for noncancer effects are below 1, the level of concern. Concentrations of lead in soil and sediment are below the U.S. EPA Region 9 PRG. A cancer risk was not evaluated for groundwater because no carcinogenic chemicals were detected in groundwater samples collected at Site 17. The segregated HI for residential exposure to groundwater was less than 1.

2.7.2 Ecological Risk Assessment

The objective of the ERA was to evaluate the nature and extent of risks posed to the environment from the release of hazardous substances at the Sites 13 and 17. The ERA consisted of a screening level exposure estimate and risk characterization. The steps of the ERA included (1) identifying ecological receptors that could be at risk, (2) identifying chemicals of ecological concern (COEC), (3) identifying potentially complete exposure pathways, (4) formulating a conceptual site model, and (5) characterizing and evaluating risk using a weight-of-evidence approach. Risk characterization integrates the information gained during the assessment of exposure and ecological effects and describes the relationship between potential environmental stressors and adverse ecological effects. Existing site-specific information and reviews of scientific literature are used to evaluate the risk posed by site-specific chemicals. The available information is used in a weight-of-evidence approach to characterize risk to the ecological receptors.

2.7.2.1 Site 13 - Burn Area

The habitat of Site 13 is disturbed grasslands that have been grazed by cattle. The vegetation is dominated by yellow thistle and non-native grasses. Soils at the trench areas formerly used to burn ordnance often are gravelly (top soil was not present) and were typically barren at the time of the RI.

A chemical detected at Site 13 was identified as a chemical of ecological concern if it exceeded the ambient concentration established for the site in at least 10 percent of the samples, or if the concentration of the chemical in the waste extraction test exceeded the freshwater chronic ambient water quality criteria in at least 10 percent of the samples.

Beryllium, cadmium, lead, and zinc were detected in soils at concentrations above ambient levels and in more than 10 percent of the soil samples. Copper, lead, mercury, and zinc in waste extraction test liquid extract from soil samples were detected at concentrations that exceeded the chronic freshwater ambient

water quality criteria. However, these metals are not expected to be bioavailable, based on the following lines of evidence: (1) concentrations of metal in the weak acid liquid extract from the in waste extraction tests were generally two to three orders of magnitude less than concentrations of metals in bulk soils; (2) weak acid extractions of metals completed as part of the comprehensive soil analysis indicated limited availability of potentially toxic metals, especially in surface soils where wildlife is most likely to encounter the chemicals; and (3) the results of the Microtox bioassay indicated only limited bioavailability of inorganic chemicals in soils.

Another assessment of risk posed by chemicals in soils at Site 13 focused on trophic transfer of contaminants from soil to plant and animal receptors. Results of the food-chain evaluation using conservative exposure parameters indicated potential risk to the coyote (from cadmium) and California quail (from lead) based on the hazard quotient (HQ). The HQ for coyotes that ingest cadmium was 5.8, and for quail that ingest lead was 1.1. Although HQs greater than 1.0 indicate the potential for a toxic response, the low measures of bioavailability of metals in soils indicate acceptable risk to receptors at Site 13.

Based on these quantitative and qualitative screening evaluations and observations of the site during field surveys, Site 13 does not pose an unacceptable risk to the environment.

2.7.2.2 Site 17 - Building IA-24

The ERA for Site 17 itself concluded after a lack of significant habitat was found near the building and minimal use of the site by area fauna was reported (approximately 90 percent of the site is covered by buildings and paved areas). However, the habitat value of Seal Creek is significant, so the potential for ecological impact to riparian receptors at the area of Seal Creek from discharge of the steam pipe was evaluated. The potential risk to aquatic biota was evaluated by comparing site-specific sediment data with (1) site-specific ambient concentrations in soil, and (2) effects range-median (ER-M) values (Long and Morgan 1990). The ER-M represents the 50th percentile, or median, of the effects data. Adverse biological effects are expected at concentrations above the ER-M.

Only beryllium in sediment samples exceeded background concentrations (for soils) in the area. TPH-mo was detected in sediments at concentrations up to 4,100 mg/kg, indicating that hydrocarbons were discharged from the outfall of the steam cleaner to the streambed area. As no ER-M is available for TPH, chemical screening and risk characterization related to TPH focused on the persistent toxic constituents of motor oil (polynuclear aromatic hydrocarbons [PAHs] and benzene, toluene, ethylbenzene, and xylene [BTEx]). TPH-mo was not considered a COEC because no VOCs (including BTEx) or SVOCs

(including PAHs) were detected in sediments. Several metals exceeded background concentrations for soil in the single soil sample collected from the creek bank near the outfall; however, only the concentration of nickel also exceeded the ER-M. Should the creek bank erode, as expected, and soil is deposited into the streambed, the soil is expected to be dispersed to Suisun Bay. The amount of nickel in this soil sample falls within the range of background concentrations for nickel in the San Francisco Bay sediment, which exceed the ER-M by a factor of 2.0. Thus, concentrations of nickel in soil near Seal Creek are not sufficiently elevated to warrant concern.

Site 17 does not pose an unacceptable risk to the environment based on these quantitative and qualitative risk screening evaluations and observations of the site during field surveys.

2.8 DESCRIPTION OF NO ACTION ALTERNATIVE

Based on the results of the RI, as described in this ROD, Inland Area Sites 13 and 17 do not pose an unacceptable risk to human health or the environment. The potential risks associated with exposure to hazardous substances in soil and groundwater at these sites are either within or below U.S. EPA's acceptable levels for the anticipated current and future land uses of the sites, including unrestricted use of the property. Accordingly, no action is appropriate for Sites 13 and 17. The U.S. EPA and Cal/EPA agree with this determination. The Navy's selection of no action for these sites reflects the determination that the overall condition of Sites 13 and 17 is protective of human health and the environment.

2.9 DOCUMENTATION OF SIGNIFICANT CHANGES

The proposed plan for Sites 13 and 17 was released for public comment on March 19, 1999. The proposed plan identified no action as the preferred alternative. The Navy reviewed all written and verbal comments submitted during the public comment period. Based on this review, the Navy concluded that no significant changes to the remedy, as originally identified in the proposed plan, were necessary or appropriate.

REFERENCES

- Agency for Toxic Substances and Disease Registry. 1995. "Toxicological Profile for Polycyclic Aromatic Hydrocarbons." TP-92/06. August.
- California Department of Toxic Substances Control (DTSC). 1994. Memorandum Regarding Recommended Outline for Using U.S. Environmental Protection Agency Region 9 Preliminary Remediation Goals in Screening Risk Assessments at Military Facilities. From DTSC Toxicologist. To the Office of Military Facilities. October 28.
- DTSC. 1999. LeadSpread Lead Risk Assessment Spreadsheet, Version 7. March. <http://www.cwo.com/~herd1/ledspred.htm>.
- Long, E.R. and L.G. Morgan. 1990. "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program." NOS OMA 52. U.S. National Oceanic and Atmospheric Administration, Seattle, Washington.
- PRC Environmental Management, Inc. (PRC). 1993. "Draft Final, Inland Area Sites, Site Investigation Report, Naval Weapons Station, Concord, California." March.
- PRC. 1995a. "Remedial Investigation/Feasibility Study, Inland Area Sites, Ecological Assessment, Work Plan, Draft Final, Naval Weapons Station, Concord, California." February 3.
- PRC. 1995b. "Remedial Investigation/Feasibility Study, Inland Area Sites, Work Plan, Draft Final, Naval Weapons Station, Concord, California." February 3.
- Tetra Tech EM Inc. (TtEMI). 1997. "Draft Final Inland Area Sites Remedial Investigation Report, Naval Weapon Station SBD Concord, Concord, California." October.
- TtEMI. 1998a. "Draft Results of Soil Removal at Site 13, Napalm Trench, Inland Area, Naval Weapon Station SBD Concord, Concord, California." May 29.
- TtEMI. 1998b. Letter from Anju Wicke, TtEMI, to Clint Fisher, Engineering Field Activity – West (EFA WEST), regarding results of Phase II Remedial Investigation Sampling, Site 17, Naval Weapon Station SBD Concord. June 23.
- U.S. EPA. 1991. OSWER Directive 9355.0-30. "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions." April 22.
- U.S. EPA. 1995. Memorandum Regarding Region 9 Preliminary Remediation Goals (PRGs). From Stanford J. Smucker, Regional Toxicologist. To PRG Table Mailing List. September 1.
- U.S. EPA. 1996. Memorandum Regarding Region 9 Preliminary Remediation Goals (PRGs). From Stanford J. Smucker, Regional Toxicologist. To PRG Table Mailing List. August 1.
- U.S. EPA. 2000. Memorandum Regarding Region 9 Preliminary Remediation Goals (PRGs). From Stanford J. Smucker, Regional Toxicologist. To PRG Table Mailing List. November.

APPENDIX A

RESPONSIVENESS SUMMARY FOR INLAND SITES 13 AND 17

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1.0 OVERVIEW

In March and April 1999, the Navy presented to the public the “Inland Area Sites 13, 17, 22, and 27 Proposed Plan” for Naval Weapons Station Seal Beach Detachment (SBD) Concord, to describe its proposed approach to addressing the four sites. Since that time, the Navy has decided to revise the record of decision (ROD) to address only Sites 13 and 17. This responsiveness study has been edited in accordance with the reduced scope of the ROD. Although this responsiveness summary has been edited to a limit extent, public comments and Navy responses to public commentary have not been altered to exclude mention of Sites 24a, 22 or 27.

Sites 13 and 17 were investigated as part of the Navy’s Installation Restoration Program, a comprehensive environmental investigation and cleanup program that mirrors the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLA requires that a responsiveness summary be prepared after the public comment period ends. The responsiveness summary must meet two requirements:

- Detail community comments on the Navy’s proposed cleanup alternative presented in the proposed plan
- Present the Navy’s responses to those comments

This document has been prepared to fulfill these requirements.

The proposed plan presented the Navy’s rationale for proposing the four sites for no action. A 45-day public comment period was held from March 19, 1999, to May 3, 1999. A public meeting was held to present the proposed plan and receive public comment on April 7, 1999. Notice of the public meeting was provided to the community mailing list and issued in the *Contra Costa Times*. No written comments were received on the proposed plan; however, oral comments were received from two community members at the April 7 public meeting.

The selected approach to addressing Sites 13 and 17 is described in the record of decision; it is the same as the preferred approach for these sites that was described in the proposed plan.

Section 2.0 of this document presents background information on the community involvement programs at Naval Weapon Station SBD Concord. Section 3.0 presents the public comments received at the April 7, 1999, meeting on the proposed plan, and the Navy’s responses.

2.0 BACKGROUND ON COMMUNITY INVOLVEMENT

The Navy has conducted an active community involvement program at Naval Weapon Station SBD Concord since 1989 and has initiated a wide range of activities. Numerous open houses, site tours, and community meetings have been held to explain the environmental investigation and cleanup process and solicit community input on the Navy's approach. Fact sheets have been sent to a community mailing list that includes elected officials, community organizations and interest groups, residents, and local businesses.

A community relations plan (CRP) for Naval Weapon Station SBD Concord was prepared in February 1996. The CRP presents an outreach program to inform and involve the community in the cleanup decision-making process. An information repository has been established to provide public access to detailed information on environmental cleanup at Naval Weapon Station SBD Concord. The repository is located at Central Library/Pleasant Hill, Contra Costa County Library, 1750 Oak Boulevard, Pleasant Hill, California. Additionally, an administrative record has been established at the library that includes documentation to support final decisions on how to address sites undergoing environmental investigations and cleanup at Naval Weapon Station SBD Concord. Both the information repository and administrative record are available for public review.

The Navy established a restoration advisory board (RAB) composed of community members to provide a forum for ongoing dialogue among the Navy, regulatory agencies, and the community on environmental cleanup issues at Naval Weapon Station SBD Concord. The RAB included a wide range of community members. The goal of the RAB is to advise the Navy on its cleanup approach and to review and comment on environmental cleanup documents. RAB meetings are held as needed and are open to the public.

3.0 PUBLIC COMMENTS AND THE NAVY'S RESPONSES

The following summary reflects comments and questions raised during the public meeting that was conducted by the Navy on April 7, 1999. The purpose of the public meeting was to (1) present the proposed plan for the four Inland Area sites to the community, (2) receive community comments on the proposed plan, and (3) respond to questions. Two community members provided comments during the public meeting. Their comments are summarized below. The Navy provided brief oral responses to community member questions in the public meeting. The following is the Navy's formal and complete response to the comments received.

No written comments were received during the 45-day public comment period.

3.1 COMMENTS FROM MARCUS O'CONNELL, COMMUNITY MEMBER

1. **Comment:** **Mr. O'Connell raised concern that the Clyde/Concord community is situated over a very high water table and people pump groundwater to water their yards. He questioned whether contaminants from Site 13 (for example, elevated concentrations of benzo(a)pyrene, manganese, lead, and barium) could have entered the groundwater and pose a risk to children playing on yards watered by that groundwater.**

Response: A total of 312 soil samples from Site 13 were collected and analyzed. With respect to benzo(a)pyrene, the amount detected in the soil was at concentrations within the U.S. Environmental Protection Agency (U.S. EPA) acceptable risk range; that is, the concentrations were not at levels that U.S. EPA would consider to pose an unacceptable risk. This chemical is a residual of the ashes created from historical fire-fighting training at Site 13, and its presence at the site was expected. With respect to its possible effects on the groundwater, benzo(a)pyrene is not very soluble in water; that is, it will not dissolve easily. As a result, benzo(a)pyrene is unlikely to contaminate the groundwater.

Manganese is a naturally occurring metal often found in rocks, soils, and groundwater. The Navy collected and analyzed groundwater samples from two separate wells, and only one sample contained an elevated concentration of manganese (resampling of the well in May 2000 did not detect elevated concentrations of manganese). The fact that the original sample was not filtered explains the cause of the elevated concentration of manganese. Based on the results from all of the samples collected at the site, elevated concentrations of soluble manganese in groundwater do not appear to be present at the site.

Groundwater samples were also analyzed for lead and barium; all the samples collected showed concentrations of lead and barium below screening levels that U.S. EPA has established for testing tap water. As a result, the concentrations of lead and barium did not warrant further investigation.

2. **Comment:** **Mr. O’Connell noted that groundwater samples should be collected during both the rainy and dry seasons to account for varying groundwater flow rates.**

Response: Groundwater samples from the burn pit area (Site 13) were collected in July and August 1992 and June and September 1995. Samples from monitoring well MW-10 at Site 13 were also collected in May 2000. Samples were collected throughout the year at the remaining three sites (Sites 17, 22, and 24), including during the rainy and dry seasons.

3.2 COMMENTS FROM BEATRICE GAYLORD, COMMUNITY MEMBER

1. **Comment:** **Ms. Gaylord expressed concern that Naval Weapon Station SBD Concord property may be transferred in the future for residential or business use.**

Response: There are currently no plans to transfer Naval Weapon Station SBD Concord property. The Navy’s current focus is to ensure that the environmental condition of the property is appropriate for its present use. In the event that the property is slated for transfer in the future, the Navy is required to evaluate the environmental condition of the entire base property (from “fence to fence”) and undertake a series of steps to clean up the property to levels appropriate for its intended future use.

2. **Comment:** **Ms. Gaylord asked whether private companies operate within the boundaries of the station and whether they must adhere to applicable environmental requirements.**

Response: There are currently no private industries operating on Naval Weapon Station SBD Concord property. The Navy acquired contaminated land from several private industrial facilities that operate or have operated adjacent to Navy land. The Navy is evaluating or cleaning up any contamination present on these contaminated parcels (located in the area of Naval Weapon Station SBD Concord called the “Litigation Area”). Any existing industries that are currently operating are located outside of the base.

APPENDIX B

HUMAN HEALTH RISK ASSESSMENT TABLES

TABLE B-1
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
COMMERCIAL/INDUSTRIAL WORKER, RME SCENARIO, 0- TO 0.5-FOOT DEPTH INTERVAL
SITE 13 - BURN AREA
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Industrial Soil PRG ^a (mg/kg)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.60E+04	--	1.00E+05	--	1.60E-01
Antimony	2.40E+00	--	8.20E+02	--	2.93E-03
Barium	3.90E+02	--	1.00E+05	--	3.90E-03
Beryllium	4.10E-01	2.20E+03	3.70E+03	1.86E-10	1.11E-04
Cadmium	1.10E+00	3.00E+03	8.10E+02	3.67E-10	1.36E-03
Chromium ^b	4.00E+01	--	1.00E+05	--	4.00E-04
Cobalt	1.70E+01	--	1.00E+05	--	1.70E-04
Copper	5.80E+01	--	7.60E+04	--	7.63E-04
Manganese	8.30E+02	--	3.20E+04	--	2.59E-02
Mercury	1.10E-01	--	6.10E+02	--	1.80E-04
Nickel ^c	6.10E+01	--	4.10E+04	--	1.49E-03
Silver	7.30E+00	--	1.00E+04	--	7.30E-04
Zinc	2.10E+02	--	1.00E+05	--	2.10E-03
Semivolatile Organic Compounds					
2,4-Dinitrotoluene	1.20E-01	--	1.80E+03	--	6.67E-05
Benzo(c)pyrene ^d	2.10E-02	--	5.40E+04	--	3.89E-07
Benzoic acid	2.60E-02	--	1.00E+05	--	2.60E-07
Chrysene	1.70E-02	2.90E+02	--	5.86E-11	--
Fluoranthene	6.00E-03	--	3.00E+04	--	2.00E-07
n-Nitrosodiphenylamine	6.30E-02	5.00E+02	--	1.26E-10	--
Phenol	6.60E-01	--	1.00E+05	--	6.60E-06
Pyrene	6.00E-03	--	5.40E+04	--	1.11E-07
TPH Extractable					
Diesel	1.10E+01	--	--	--	--
Motor Oil	4.20E+01	--	--	--	--
Anions					
Nitrate	5.00E-01	--	--	--	--
Nitrite	1.70E-01	--	--	--	--
TOTAL				7.4E-10	2.0E-01

Notes:

mg/kg Milligram per kilogram
PRG Preliminary remediation goal
RME Reasonable maximum exposure
TPH Total petroleum hydrocarbon

a U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2000).
b The PRG is for chromium III.
c The PRG is for soluble salts of nickel.
d The PRG is for pyrene, which was used as a surrogate chemical.

-- Not available or not calculated because a PRG was not available.

TABLE B-2
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
COMMERCIAL/INDUSTRIAL WORKER, RME SCENARIO, 0- TO 10-FOOT DEPTH INTERVAL
SITE 13 - BURN AREA
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Industrial Soil PRG ^a (mg/kg)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.70E+04	--	1.00E+05	--	1.70E-01
Antimony	2.20E+00	--	8.20E+02	--	2.68E-03
Barium	4.30E+02	--	1.00E+05	--	4.30E-03
Beryllium	4.50E-01	2.20E+03	3.70E+03	2.05E-10	1.22E-04
Cadmium	4.70E-01	3.00E+03	8.10E+02	1.57E-10	5.80E-04
Chromium ^b	4.70E+01	--	1.00E+05	--	4.70E-04
Cobalt	1.70E+01	--	1.00E+05	--	1.70E-04
Copper	4.60E+01	--	7.60E+04	--	6.05E-04
Manganese	7.80E+02	--	3.20E+04	--	2.44E-02
Mercury	1.20E-01	--	6.10E+02	--	1.97E-04
Molybdenum	1.20E+00	--	1.00E+04	--	1.20E-04
Nickel ^c	7.70E+01	--	4.10E+04	--	1.88E-03
Selenium	4.70E-01	--	1.00E+04	--	4.70E-05
Silver	1.20E+00	--	1.00E+04	--	1.20E-04
Zinc	9.40E+01	--	1.00E+05	--	9.40E-04
Volatile Organic Compounds					
Chloroform	1.00E-03	5.20E-01	1.30E+00	1.92E-09	7.69E-04
O-xylene	1.40E-03	--	2.10E+02	--	6.67E-06
Toluene	2.30E-03	--	5.20E+02	--	4.42E-06
Semivolatile Organic Compounds					
2,4-Dinitrotoluene	1.20E-01	--	1.80E+03	--	6.67E-05
2-Chlorophenol	1.90E-01	--	2.40E+02	--	7.92E-04
2-Methylnaphthalene ^d	7.40E-02	--	1.90E+02	--	3.89E-04
Benzo(a)pyrene	1.90E-01	2.90E-01	--		
Benzo(b)fluoranthene	1.90E-01	2.90E+00	--		
Benzo(e)pyrene ^e	2.10E-02	--	5.40E+04	--	3.89E-07
Benzoic acid	2.60E-02	--	1.00E+05	--	2.60E-07
Chrysene	2.10E-01	2.90E+02	--	7.24E-10	--
Fluoranthene	3.10E-02	--	3.00E+04	--	1.03E-06
n-Nitrosodiphenylamine	6.30E-02	5.00E+02	--	1.26E-10	--
Naphthalene	7.50E-02	--	1.90E+02		
Phenol	2.90E-01	--	1.00E+05	--	2.90E-06
Pyrene	1.90E-01	--	5.40E+04	--	3.52E-06
TPH Extractable					
Diesel	1.20E+01	--	--	--	--
Motor Oil	2.60E+01	--	--	--	--
Anions					
Nitrate	8.10E-01	--	--	--	--
Nitrite	1.50E-01	--	--	--	--
TOTAL				3.1E-09	2.1E-01

Notes:

- mg/kg Milligram per kilogram
- PRG Preliminary remediation goal
- RME Reasonable maximum exposure
- TPH Total petroleum hydrocarbon
- a U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2000).
- b The PRG is for chromium III.
- c The PRG is for soluble salts of nickel.
- d The PRG is for naphthalene, which was used as a surrogate chemical.
- e The PRG is for pyrene, which was used as a surrogate chemical.
- Not available or not calculated because a PRG was not available.

TABLE B-3
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
RESIDENT, RME SCENARIO, 0- TO 0.5-FOOT DEPTH INTERVAL
SITE 13 - BURN AREA
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Residential Soil PRG ^a (mg/kg)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.60E+04	--	7.60E+04	--	2.11E-01
Antimony	2.40E+00	--	3.10E+01	--	7.74E-02
Barium	3.90E+02	--	5.40E+03	--	7.22E-02
Beryllium	4.10E-01	1.10E+03	1.50E+02	3.73E-10	2.73E-03
Cadmium	1.10E+00	9.00E+00	3.70E+01	1.22E-07	2.97E-02
Chromium ^b	4.00E+01	--	1.00E+05	--	4.00E-04
Cobalt	1.70E+01	--	4.70E+03	--	3.62E-03
Copper	5.80E+01	--	2.90E+03	--	2.00E-02
Manganese	8.30E+02	--	1.80E+03	--	4.61E-01
Mercury	1.10E-01	--	2.30E+01	--	4.78E-03
Nickel ^c	6.10E+01	--	1.50E+02	--	4.07E-01
Silver	7.30E+00	--	3.90E+02	--	1.87E-02
Zinc	2.10E+02	--	2.30E+04	--	9.13E-03
Semivolatile Organic Compounds					
2,4-Dinitrotoluene	1.20E-01	--	1.20E+02	--	1.00E-03
Benzo(e)pyrene ^d	2.10E-02	--	2.30E+03	--	9.13E-06
Benzoic acid	2.60E-02	--	1.00E+05	--	2.60E-07
Chrysene	1.70E-02	6.20E+01	--	2.74E-10	--
Fluoranthene	6.00E-03	--	2.30E+03	--	2.61E-06
n-Nitrosodiphenylamine	6.30E-02	9.90E+01	--	6.36E-10	--
Phenol	6.60E-01	--	3.70E+04	--	1.78E-05
Pyrene	6.00E-03	--	2.30E+03	--	2.61E-06
TPH Extractable					
Diesel	1.10E+01	--	--	--	--
Motor Oil	4.20E+01	--	--	--	--
Anions					
Nitrate	5.00E-01	--	--	--	--
Nitrite	1.70E-01	--	--	--	--
TOTAL				1.2E-07	1.3E+00

Notes:

mg/kg	Milligram per kilogram
PRG	Preliminary remediation goal
RME	Reasonable maximum exposure
TPH	Total petroleum hydrocarbon
a	U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2000).
b	The PRG is for chromium III.
c	The PRG is for soluble salts of nickel.
d	The PRG is for pyrene, which was used as a surrogate chemical.
--	Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	Hazard Index
CNS	4.67E-01
Liver	0.00E+00
Renal	2.97E-02
Lung	2.34E-01
Blood	9.13E-03
Skin	1.87E-02
Reproductive	1.78E-05
General	4.84E-01
None	7.26E-02
TOTAL	1.3E+00

TABLE B-4
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
RESIDENT, RME SCENARIO, 0- TO 10-FOOT DEPTH INTERVAL
SITE 13 - BURN AREA
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Residential Soil PRG ^a (mg/kg)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.70E+04	--	7.60E+04	--	2.24E-01
Antimony	2.20E+00	--	3.10E+01	--	7.10E-02
Barium	4.30E+02	--	5.40E+03	--	7.96E-02
Beryllium	4.50E-01	1.10E+03	1.50E+02	4.09E-10	3.00E-03
Cadmium	4.70E-01	9.00E+00	3.70E+01	5.22E-08	1.27E-02
Chromium ^b	4.70E+01	--	1.00E+05	--	4.70E-04
Cobalt	1.70E+01	--	4.70E+03	--	3.62E-03
Copper	4.60E+01	--	2.90E+03	--	1.59E-02
Manganese	7.80E+02	--	1.80E+03	--	4.33E-01
Mercury	1.20E-01	--	2.30E+01	--	5.22E-03
Molybdenum	1.20E+00	--	3.90E+02	--	3.08E-03
Nickel ^c	7.70E+01	--	1.50E+02	--	5.13E-01
Selenium	4.70E-01	--	3.90E+02	--	1.21E-03
Silver	1.20E+00	--	3.90E+02	--	3.08E-03
Zinc	9.40E+01	--	2.30E+04	--	4.09E-03
Volatile Organic Compounds					
Chloroform	1.00E-03	2.40E-01	3.90E-01	4.17E-09	2.56E-03
O-xylene	1.40E-03	--	2.10E+02	--	6.67E-06
Toluene	2.30E-03	--	5.20E+02	--	4.42E-06
Semivolatile Organic Compounds					
2,4-Dinitrotoluene	1.20E-01	--	1.20E+02	--	1.00E-03
2-Chlorophenol	1.90E-01	--	6.30E+01	--	3.02E-03
2-Methylnaphthalene ^e	7.40E-02	--	5.60E+01	--	1.32E-03
Benzo(a)pyrene	1.90E-01	6.20E-02	--	--	--
Benzo(b)fluoranthene	1.90E-01	6.20E-01	--	--	--
Benzo(e)pyrene ^d	2.10E-02	--	2.30E+03	--	9.13E-06
Benzoic acid	2.60E-02	--	1.00E+05	--	2.60E-07
Chrysene	2.10E-01	6.20E+01	--	3.39E-09	--
Fluoranthene	3.10E-02	--	2.30E+03	--	1.35E-05
n-Nitrosodiphenylamine	6.30E-02	9.90E+01	--	6.36E-10	--
Naphthalene	7.50E-02	--	5.60E+01	--	--
Phenol	2.90E-01	--	3.70E+04	--	7.84E-06
Pyrene	1.90E-01	--	2.30E+03	--	8.26E-05
TPH Extractable					
Diesel	1.20E+01	--	--	--	--
Motor Oil	2.60E+01	--	--	--	--
Anions					
Nitrate	8.10E-01	--	--	--	--
Nitrite	1.50E-01	--	--	--	--
TOTAL				6.1E-08	1.4E+00

Notes:

mg/kg Milligram per kilogram

PRG Preliminary remediation goal

RME Reasonable maximum exposure

TPH Total petroleum hydrocarbon

a U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2000)

b The PRG is for chromium III.

c The PRG is for soluble salts of nickel.

d The PRG is for pyrene, which was used as a surrogate chemical.

-- Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	Hazard Index
CNS	4.40E-01
Liver	3.77E-03
Renal	1.28E-02
Lung	2.43E-01
Blood	4.09E-03
Skin	3.08E-03
Reproductive	3.02E-03
General	5.89E-01
None	8.01E-02
TOTAL	1.4E+00

TABLE B-5
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO GROUNDWATER
RESIDENT, RME SCENARIO
SITE 13 - BURN AREA
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/L)	Residential Tap Water PRG ^a (µg/L)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	4.70E-01	--	3.60E+04	--	1.31E-02
Barium	1.70E-01	--	2.60E+03	--	6.54E-02
Calcium	7.90E+01	--	--	--	--
Chromium ^b	5.40E-03	--	5.50E+04	--	9.82E-05
Cobalt	4.40E-04	--	2.20E+03	--	2.00E-04
Iron	1.30E+00	--	1.10E+04	--	1.18E-01
Magnesium	5.60E+01	--	--	--	--
Manganese	4.45E-01	--	8.80E+02	--	5.06E-01
Molybdenum	6.00E-02	--	1.80E+02	--	3.33E-01
Potassium	5.70E+00	--	--	--	--
Selenium	7.50E-03	--	1.80E+02	--	4.17E-02
Sodium	1.50E+02	--	--	--	--
Thallium	2.30E-03	--	2.40E+00	--	9.58E-01
Vanadium	7.50E-03	--	2.60E+02	--	2.88E-02
Zinc	1.40E-02	--	1.10E+04	--	1.27E-03
Semivolatile Organic Compounds					
4-Methylphenol	5.40E-03	--	1.80E+02	--	3.00E-02
TPH Extractable					
Diesel	7.10E-02	--	--	--	--
Anions					
Chloride	3.00E+02	--	--	--	--
Fluoride	5.80E-01	--	2.20E+03	--	2.64E-01
Nitrate	4.90E+00	--	1.00E+04	--	4.90E-01
Sulfate	1.40E+02	--	--	--	--
TOTAL				0.0E+00	2.8E+00

Notes:

µg/L	Microgram per liter
mg/L	Milligram per liter
PRG	Preliminary remediation goal
RME	Reasonable maximum exposure
TPH	Total petroleum hydrocarbon
a	U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2000).
b	The PRG is for chromium III.
--	Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	Hazard Index
CNS	5.06E-01
Liver	4.17E-02
Renal	0.00E+00
Lung	4.21E-02
Blood	1.27E-03
Skin	0.00E+00
Reproductive	0.00E+00
General	3.33E-01
None	6.55E-02
TOTAL	2.8E+00

TABLE B-6
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
COMMERCIAL/INDUSTRIAL WORKER, RME SCENARIO, 0- TO 0.5-FOOT DEPTH INTERVAL
SITE 17, BUILDING 1A-24
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Industrial Soil PRG ^a (mg/kg)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.40E+04	--	1.00E+05	--	1.40E-01
Antimony	4.60E+00	--	8.20E+02	--	5.61E-03
Barium	1.40E+02	--	1.00E+05	--	1.40E-03
Beryllium	4.40E-01	2.20E+03	3.70E+03	2.00E-10	1.19E-04
Cadmium	3.10E+00	3.00E+03	8.10E+02	1.03E-09	3.83E-03
Chromium ^b	4.60E+01	--	1.00E+05	--	4.60E-04
Cobalt	1.60E+01	--	1.00E+05	--	1.60E-04
Copper	4.60E+01	--	7.60E+04	--	6.05E-04
Lead ^c	2.30E+02	--	--	--	--
Manganese	5.70E+02	--	3.20E+04	--	1.78E-02
Mercury	9.40E-02	--	6.10E+02	--	1.54E-04
Molybdenum	7.50E-01	--	1.00E+04	--	7.50E-05
Nickel ^c	5.70E+01	--	4.10E+04	--	1.39E-03
Silver	2.70E+00	--	1.00E+04	--	2.70E-04
Vanadium	5.20E+01	--	1.40E+04	--	3.71E-03
Zinc	1.50E+02	--	1.00E+05	--	1.50E-03
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.70E-02	2.90E+00	--	3.00E-08	--
Benzo(a)pyrene	1.10E-01	2.90E-01	--	3.79E-07	--
Benzo(b)fluoranthene	1.10E-01	2.90E+00	--	3.79E-08	--
Benzo(g,h,i)perylene ^d	9.90E-02	--	5.40E+04	--	1.83E-06
Benzo(k)fluoranthene	1.30E-01	2.90E+01	--	4.48E-09	--
Chrysene	1.50E-01	2.90E+02	--	5.17E-10	--
Dibenz(a,h)anthracene	2.40E-02	2.90E-01	--	8.28E-08	--
Fluoranthene	1.60E-01	--	3.00E+04	--	5.33E-06
Indeno(1,2,3-cd)pyrene	8.30E-02	2.90E+00	--	2.86E-08	--
Phenanthrene ^d	7.00E-02	--	5.40E+04	--	1.30E-06
Pyrene	1.90E-01	--	5.40E+04	--	3.52E-06
TPH Extractable					
Diesel	6.60E+01	--	--	--	--
Motor Oil	1.30E+03	--	--	--	--
TPH Purgable					
Gasoline	8.20E-02	--	--	--	--
TOTAL				5.6E-07	1.8E-01

Notes:

- mg/kg Milligram per kilogram
PRG Preliminary remediation goal
RME Reasonable maximum exposure
TPH Total petroleum hydrocarbon
- a U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2000).
b The PRG is for chromium III.
c Lead is evaluated using the California Department of Toxic Substances Control (DTSC) LeadSpread Program (DTSC 2000).
d The PRG is for soluble salts of nickel.
- Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	Hazard Index
CNS	1.80E-02
Liver	0.00E+00
Renal	3.84E-03
Lung	1.44E-01
Blood	1.50E-03
Skin	2.70E-04
Reproductive	0.00E+00
General	7.08E-03
None	1.86E-03
TOTAL	1.8E-01

TABLE B-7
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
COMMERCIAL/INDUSTRIAL WORKER, RME SCENARIO, 0- TO 10-FOOT DEPTH INTERVAL
SITE 17, BUILDING 1A-24
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Industrial Soil PRG ^a (mg/kg)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.50E+04	--	1.00E+05	--	1.50E-01
Antimony	1.90E+00	--	8.20E+02	--	2.32E-03
Barium	1.70E+02	--	1.00E+05	--	1.70E-03
Beryllium	9.50E-01	2.20E+03	3.70E+03	4.32E-10	2.57E-04
Cadmium	1.10E+00	3.00E+03	8.10E+02	3.67E-10	1.36E-03
Chromium ^b	3.80E+01	--	1.00E+05	--	3.80E-04
Cobalt	1.60E+01	--	1.00E+05	--	1.60E-04
Copper	3.40E+01	--	7.60E+04	--	4.47E-04
Manganese	5.80E+02	--	3.20E+04	--	1.81E-02
Mercury	9.30E-02	--	6.10E+02	--	1.52E-04
Molybdenum	7.80E-01	--	1.00E+04	--	7.80E-05
Nickel ^c	5.50E+01	--	4.10E+04	--	1.34E-03
Silver	2.50E+01	--	1.00E+04	--	2.50E-03
Vanadium	5.50E+01	--	1.40E+04	--	3.93E-03
Zinc	7.50E+01	--	1.00E+05	--	7.50E-04
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.70E-02	2.90E+00	--	3.00E-08	--
Benzo(a)pyrene	1.10E-01	2.90E-01	--	3.79E-07	--
Benzo(b)fluoranthene	1.10E-01	2.90E+00	--	3.79E-08	--
Benzo(g,h,i)perylene ^d	9.90E-02	--	5.40E+04	--	1.83E-06
Benzo(k)fluoranthene	1.30E-01	2.90E+01	--	4.48E-09	--
Chrysene	1.50E-01	2.90E+02	--	5.17E-10	--
Dibenz(a,h)anthracene	2.40E-02	2.90E-01	--	8.28E-08	--
Fluoranthene	1.60E-01	--	3.00E+04	--	5.33E-06
Indeno(1,2,3-cd)pyrene	8.30E-02	2.90E+00	--	2.86E-08	--
Phenanthrene ^d	7.00E-02	--	5.40E+04	--	1.30E-06
Phenol	4.00E-01	--	1.00E+05	--	--
Pyrene	1.90E-01	--	5.40E+04	--	3.52E-06
TPH Extractable					
Diesel	2.50E+01	--	--	--	--
Motor Oil	1.30E+03	--	--	--	--
TPH Purgable					
Gasoline	8.20E-02	--	--	--	--
TOTAL				5.6E-07	1.8E-01

Notes:

mg/kg Milligram per kilogram
PRG Preliminary remediation goal
RME Reasonable maximum exposure
TPH Total petroleum hydrocarbon

a U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2000).
b The PRG is for chromium III.
c The PRG is for soluble salts of nickel.
d The PRG is for pyrene, which was used as a surrogate chemical.

-- Not available or not calculated because a PRG was not available.

TABLE B-8
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
RESIDENT, RME SCENARIO, 0- TO 0.5-FOOT DEPTH INTERVAL
SITE 17, BUILDING 1A-24
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Residential Soil PRG ^a (mg/kg)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.40E+04	--	7.60E+04	--	1.84E-01
Antimony	4.60E+00	--	3.10E+01	--	1.48E-01
Barium	1.40E+02	--	5.40E+03	--	2.59E-02
Beryllium	4.40E-01	1.10E+03	1.50E+02	4.00E-10	2.93E-03
Cadmium	3.10E+00	9.00E+00	3.70E+01	3.44E-07	8.38E-02
Chromium ^b	4.60E+01	--	1.00E+05	--	4.60E-04
Cobalt	1.60E+01	--	4.70E+03	--	3.40E-03
Copper	4.60E+01	--	2.90E+03	--	1.59E-02
Lead ^c	2.30E+02	--	--	--	--
Manganese	5.70E+02	--	1.80E+03	--	3.17E-01
Mercury	9.40E-02	--	2.30E+01	--	4.09E-03
Molybdenum	7.50E-01	--	3.90E+02	--	1.92E-03
Nickel ^d	5.70E+01	--	1.50E+02	--	3.80E-01
Silver	2.70E+00	--	3.90E+02	--	6.92E-03
Vanadium	5.20E+01	--	5.50E+02	--	9.45E-02
Zinc	1.50E+02	--	2.30E+04	--	6.52E-03
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.70E-02	6.20E-01	--	1.40E-07	--
Benzo(a)pyrene	1.10E-01	6.20E-02	--	1.77E-06	--
Benzo(b)fluoranthene	1.10E-01	6.20E-01	--	1.77E-07	--
Benzo(g,h,i)perylene ^e	9.90E-02	--	2.30E+03	--	4.30E-05
Benzo(k)fluoranthene	1.30E-01	6.10E-01	--	2.13E-07	--
Chrysene	1.50E-01	6.20E+01	--	2.42E-09	--
Dibenz(a,h)anthracene	2.40E-02	6.20E-02	--	3.87E-07	--
Fluoranthene	1.60E-01	--	2.30E+03	--	6.96E-05
Indeno(1,2,3-cd)pyrene	8.30E-02	6.20E-01	--	1.34E-07	--
Phenanthrene ^e	7.00E-02	--	2.30E+03	--	3.04E-05
Pyrene	1.90E-01	--	2.30E+03	--	8.26E-05
TPH Extractable					
Diesel	6.60E+01	--	--	--	--
Motor Oil	1.30E+03	--	--	--	--
TPH Purgable					
Gasoline	8.20E-02	--	--	--	--
TOTAL				3.2E-06	1.3E+00

Notes:

mg/kg Milligram per kilogram
PRG Preliminary remediation goal
RME Reasonable maximum exposure
TPH Total petroleum hydrocarbon

a U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2000)
b The PRG is for chromium III.
c Lead is evaluated using the California Department of Toxic Substances Control (DTSC) LeadSpread Program (DTSC 2000).
d The PRG is for soluble salts of nickel.
e The PRG is for pyrene, which was used as a surrogate chemical.

-- Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	Hazard Index
CNS	3.21E-01
Liver	0.00E+00
Renal	8.40E-02
Lung	2.98E-01
Blood	6.52E-03
Skin	6.92E-03
Reproductive	0.00E+00
General	5.30E-01
None	2.64E-02
TOTAL	1.3E+00

TABLE B-9
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SOIL
RESIDENT, RME SCENARIO, 0- TO 10-FOOT DEPTH INTERVAL
SITE 17, BUILDING IA-24
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Residential Soil PRG ^a (mg/kg)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.50E+04	--	7.60E+04	--	1.97E-01
Antimony	1.90E+00	--	3.10E+01	--	6.13E-02
Barium	1.70E+02	--	5.40E+03	--	3.15E-02
Beryllium	9.50E-01	1.10E+03	1.50E+02	8.64E-10	6.33E-03
Cadmium	1.10E+00	9.00E+00	3.70E+01	1.22E-07	2.97E-02
Chromium ^b	3.80E+01	--	1.00E+05	--	3.80E-04
Cobalt	1.60E+01	--	4.70E+03	--	3.40E-03
Copper	3.40E+01	--	2.90E+03	--	1.17E-02
Manganese	5.80E+02	--	1.80E+03	--	3.22E-01
Mercury	9.30E-02	--	2.30E+01	--	4.04E-03
Molybdenum	7.80E-01	--	3.90E+02	--	2.00E-03
Nickel ^c	5.50E+01	--	1.50E+02	--	3.67E-01
Silver	2.50E+01	--	3.90E+02	--	6.41E-02
Vanadium	5.50E+01	--	5.50E+02	--	1.00E-01
Zinc	7.50E+01	--	2.30E+04	--	3.26E-03
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.70E-02	6.20E-01	--	1.40E-07	--
Benzo(a)pyrene	1.10E-01	6.20E-02	--	1.77E-06	--
Benzo(b)fluoranthene	1.10E-01	6.20E-01	--	1.77E-07	--
Benzo(g,h,i)perylene ^d	9.90E-02	--	2.30E+03	--	4.30E-05
Benzo(k)fluoranthene	1.30E-01	6.10E-01	--	2.13E-07	--
Chrysene	1.50E-01	6.20E+01	--	2.42E-09	--
Dibenz(a,h)anthracene	2.40E-02	6.20E-02	--	3.87E-07	--
Fluoranthene	1.60E-01	--	2.30E+03	--	6.96E-05
Indeno(1,2,3-cd)pyrene	8.30E-02	6.20E-01	--	1.34E-07	--
Phenanthrene ^d	7.00E-02	--	2.30E+03	--	3.04E-05
Phenol	4.00E-01	--	3.70E+04	--	--
Pyrene	1.90E-01	--	2.30E+03	--	8.26E-05
TPH Extractable					
Diesel	2.50E+01	--	--	--	--
Motor Oil	1.30E+03	--	--	--	--
TPH Purgable					
Gasoline	8.20E-02	--	--	--	--
TOTAL				3.0E-06	1.2E+00

Notes:

mg/kg	Milligram per kilogram
PRG	Preliminary remediation goal
RME	Reasonable maximum exposure
TPH	Total petroleum hydrocarbon
a	U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2000)
b	The PRG is for chromium III.
c	The PRG is for soluble salts of nickel.
d	The PRG is for pyrene, which was used as a surrogate chemical.
--	Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	Hazard Index
CNS	3.26E-01
Liver	0.00E+00
Renal	3.00E-02
Lung	3.12E-01
Blood	3.26E-03
Skin	6.41E-02
Reproductive	0.00E+00
General	4.30E-01
None	3.19E-02
TOTAL	1.2E+00

TABLE B-10
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO SEDIMENT
RESIDENT, RME SCENARIO
SITE 17, BUILDING 1A-24
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/kg)	Residential Soil PRG ^a (mg/kg)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	1.50E+04	--	7.60E+04	--	1.97E-01
Arsenic	5.70E+00	3.90E-01	2.20E+01	1.46E-05	2.59E-01
Barium	1.50E+02	--	5.40E+03	--	2.78E-02
Beryllium	4.00E-01	1.10E+03	1.50E+02	3.64E-10	2.67E-03
Chromium ^b	3.50E+01	--	1.00E+05	--	3.50E-04
Cobalt	1.60E+01	--	4.70E+03	--	3.40E-03
Copper	4.40E+01	--	2.90E+03	--	1.52E-02
Lead ^c	1.50E+01	--	--	--	--
Manganese	6.50E+02	--	1.80E+03	--	3.61E-01
Molybdenum	9.90E-01	--	3.90E+02	--	2.54E-03
Nickel ^d	5.80E+01	--	1.50E+02	--	3.87E-01
Thallium	2.10E-01	--	5.20E+00	--	4.04E-02
Vanadium	6.20E+01	--	5.50E+02	--	1.13E-01
Zinc	8.10E+01	--	2.30E+04	--	3.52E-03
TOTAL				1.5E-05	1.4E+00

Notes:

mg/kg Milligram per kilogram
PRG Preliminary remediation goal
RME Reasonable maximum exposure
TPH Total petroleum hydrocarbon

a U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2000)
b The PRG is for chromium III.
c Lead is evaluated using the California Department of Toxic Substances Control (DTSC) LeadSpread Program (DTSC 2000).
d The PRG is for soluble salts of nickel.

-- Not available or not calculated because a PRG was not available.

Hazard Index Segregation	
Target Organ	Hazard Index
CNS	3.61E-01
Liver	0.00E+00
Renal	0.00E+00
Lung	3.29E-01
Blood	3.52E-03
Skin	2.59E-01
Reproductive	0.00E+00
General	3.89E-01
None	2.81E-02
TOTAL	1.4E+00

TABLE B-11
CANCER RISK AND HAZARD INDEX FROM EXPOSURE TO GROUNDWATER
RESIDENT, RME SCENARIO
SITE 17, BUILDING 1A-24
NAVAL WEAPONS STATION SBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration (mg/L)	Residential Tap Water PRG ^a (µg/L)		Cancer Risk (unitless)	Hazard Index (unitless)
		Cancer	Noncancer		
Metals					
Aluminum	3.20E-01	--	3.60E+04	--	8.89E-03
Barium	1.30E-01	--	2.60E+03	--	5.00E-02
Calcium	6.90E+01	--	--	--	--
Chromium ^b	4.50E-03	--	5.50E+04	--	8.18E-05
Iron	4.20E-01	--	1.10E+04	--	3.82E-02
Magnesium	4.30E+01	--	--	--	--
Manganese	1.80E-02	--	8.80E+02	--	2.05E-02
Nickel ^c	2.00E-03	--	7.30E+02	--	2.74E-03
Potassium	3.00E+00	--	--	--	--
Selenium	2.90E-03	--	1.80E+02	--	1.61E-02
Sodium	6.10E+01	--	--	--	--
Vanadium	4.80E-03	--	2.60E+02	--	1.85E-02
Semivolatile Organic Compounds					
Bis(2-ethylhexyl)phthalate	3.00E-02	4.80E+00	7.30E+02	--	4.11E-02
TPH Extractable					
Diesel	5.20E-02	--	--	--	--
Motor Oil	6.40E-02	--	--	--	--
Anions					
Chloride	5.06E+01	--	--	--	--
Fluoride	1.70E-01	--	2.20E+03	--	7.73E-02
Nitrate	4.80E+00	--	1.00E+04	--	4.80E-01
Sulfate	1.28E+02	--	--	--	--
TOTAL				0.0E+00	2.0E-01

Notes:

µg/L Microgram per liter
mg/L Milligram per liter
PRG Preliminary remediation goal
RME Reasonable maximum exposure

a U.S. Environmental Protection Agency (EPA) Region 9 PRGs (EPA 2000).

b The PRG is for chromium III.

c The PRG is for soluble salts of nickel.

-- Not available or not calculated because a PRG was not available.

TABLE B-12
LEAD CONCENTRATION IN BLOOD
EXPOSURE FROM SURFACE SOIL, 0 TO 0.5-FOOT DEPTH INTERVAL
SITE 17, BUILDING IA-24
NAVAL WEAPONS STATION SBD CONCORD

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m ³)	0.028
Lead in Soil/Dust (ug/g)	230.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m ³)	1.5

OUTPUT							
	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.9	3.4	4.0	4.9	5.6	676	1063
BLOOD Pb, CHILD	4.4	8.0	9.5	11.6	13.2	146	247
BLOOD Pb, PICA CHILD	6.0	11.0	13.0	15.8	18.0	94	159
BLOOD Pb, OCCUPATIONAL	1.3	2.3	2.7	3.3	3.7	3475	5464

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm ²	5700	2900
Skin area occupational	cm ²	2900	
Soil adherence	ug/cm ²	70	200
Dermal uptake constant	(ug/dl)/(ug/dm ²)	0.0001	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/day)	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m ³ /day	20	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.08	0.19
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	103.5	

PATHWAYS						
ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.01	0%	1.4E-5	0.00	0%
Soil Ingestion	8.8E-4	0.20	11%	6.3E-4	0.14	12%
Inhalation, bkgnd		0.05	2%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	45%		0.84	67%
Food Ingestion, bkgnd		0.22	12%		0.23	19%
Food Ingestion	2.4E-3	0.55	30%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.01	0%		0.01	0%
Soil Ingestion	7.0E-3	1.62	37%	1.4E-2	3.24	54%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgnd		0.04	1%		0.04	1%
Water Ingestion		0.96	22%		0.96	16%
Food Ingestion, bkgnd		0.50	11%		0.50	8%
Food Ingestion	5.5E-3	1.28	29%		1.28	21%

Notes:

Lead is evaluated using the California Department of Toxic Substances Control (DTSC) LeadSpread Program Version 7.0 (DTSC 2000).

TABLE B-13
LEAD CONCENTRATION IN BLOOD
EXPOSURE FROM SEDIMENT
SITE 17, BUILDING IA-24
NAVAL WEAPONS STATION SBD CONCORD

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m ³)	0.028
Lead in Soil/Dust (ug/g)	15.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m ³)	1.5

OUTPUT							
	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.2	2.1	2.5	3.0	3.4	676	1063
BLOOD Pb, CHILD	1.7	3.1	3.7	4.4	5.0	146	247
BLOOD Pb, PICA CHILD	1.8	3.3	3.9	4.7	5.4	94	159
BLOOD Pb, OCCUPATIONAL	1.1	2.0	2.4	2.9	3.3	3475	5464

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm ²	5700	2900
Skin area occupational	cm ²	2900	
Soil adherence	ug/cm ²	70	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/day)	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m ³ /day	20	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.08	0.19
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	6.8	

PATHWAYS						
ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	8.8E-4	0.01	1%	6.3E-4	0.01	1%
Inhalation, bkgnd		0.05	4%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	73%		0.84	75%
Food Ingestion, bkgnd		0.22	19%		0.23	21%
Food Ingestion	2.4E-3	0.04	3%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.00	0%		0.00	0%
Soil Ingestion	7.0E-3	0.11	6%	1.4E-2	0.21	12%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgnd		0.04	2%		0.04	2%
Water Ingestion		0.96	57%		0.96	54%
Food Ingestion, bkgnd		0.50	30%		0.50	28%
Food Ingestion	5.5E-3	0.08	5%		0.08	5%

Notes:

Lead is evaluated using the California Department of Toxic Substances Control (DTSC) LeadSpread Program Version 7.0 (DTSC 2000).